$1.00 a Year WESTERN STATES EDITION 5 cents a Copy

DOMESTIC ENGINEERING

Whole No. 661 Chicago and New York, Saturday, August 12, 1905. Volume XXXII No. 7

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Headquarters of the Peace Conference

between the

Envoys of Russia and Japan

(Photograph received through the courtesy of the "Boston Traveler".)

THE GENERAL STORES BUILDING, PORTSMOUTH NAVY YARD, KITTERY, MAINE. Warmed by 2,220 square feet of AMERICAN Radiation—Rococo water pattern. Merrill & Company, Heating Contractors, Boston, Mass.

AMERICAN RADIATOR COMPANY

General Offices, 282-284 Michigan Avenue, Chicago.

See Page 31 for Addresses of Sales Branches.

"TRIED AND TESTED" ALWAYS SATISFACTORY

United Brass Goods Used by Leading Plumbers Everywhere

UNITED BRASS MFG. CO.
Cleveland, Ohio, U. S. A.

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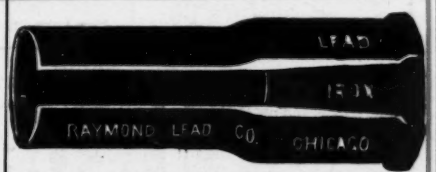

RELIABLE CONNECTIONS made between Lead and Iron Pipe by using the Raymond Ferrule—the only Lead Ferrule on the market which has an **extra thickness of lead over the shoulder**, giving strength where it is needed and where other lead ferrules are weak.

The Genuine Article Bears Our Label.

RAYMOND LEAD CO.

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INDEX TO ADVERTISEMENTS ON PAGE 54.

HOLLAND RADIATORS

Bremen Eclipse
Reliance Unique

DIRECT DIRECT-INDIRECT INDIRECT WINDOW
AND ALL SPECIALS

WRITE US FOR DESCRIPTIVE MATTER AND PRICES

HOLLAND RADIATOR COMPANY

CHICAGO
38 DEARBORN STREET

WORKS
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TEST SAMPLE FREE.
Upon request we will send a free sample of
DIXON'S GRAPHITE
PIPE JOINT COMPOUND.
PLEASE MENTION THIS PUBLICATION.
JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

Why not secure the agency for the

KELSEY WARM AIR GENERATOR!

26,000 HAVE BEEN SOLD

Any Dealer who wants to give the heating business attention and wants to get the kind of results that will enable him to sell the best trade at prices which do not have to be made to meet furnace competition, can do it with Kelseys.

KELSEY HEATING COMPANY,
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New York Office: 156 Fifth Avenue. Chicago Office: Cook & Van Evera Co., 38 Lake Street.

REGULATORS
STEAM
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Ross Valve Co.

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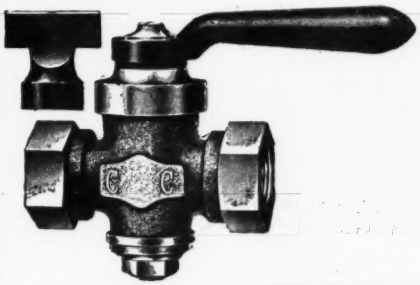
CRANE
REVERSIBLE STOP COCKS

TESTED TO 200 POUNDS PRESSURE PER SQUARE INCH



NO. 820.

The Crane Reversible Stop and Waste Cock is so constructed that by removing the screw from the handle and turning the cap a quarter turn, it can be instantly changed from right to left or vice versa. The plug is made so that either lever or tee handle can be supplied when desired. The metal used in the construction of this cock is the best that can be made, and the workmanship is of the highest class.

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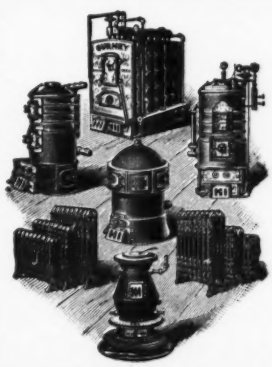
GURNEY
HOT WATER HEATERS, STEAM BOILERS, RADIATORS



EVERY HEATING PROBLEM

is different,—but "THE GURNEY" answers them all. Every ambitious fitter knows the way to build up a business is to handle a boiler which will never disappoint a customer. Ours cost no more than others, but with everything bearing the "GURNEY" name you get maximum efficiency, greatest durability, largest possible saving in fuel and general satisfaction. Write us now about the local agency

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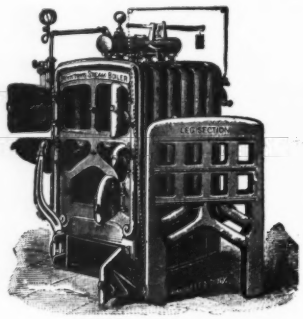
THE FIRST BEST

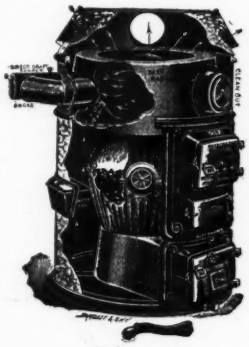
It's easy to say our hot air furnaces, steam and water heaters are the best—anyone can say that, but our record since 1849 warrants us in claiming superiority.



Steam Heater

PIONEER

THE BEST FIRST



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Great variety and large stocks to draw on.

The Boynton Furnace Co.

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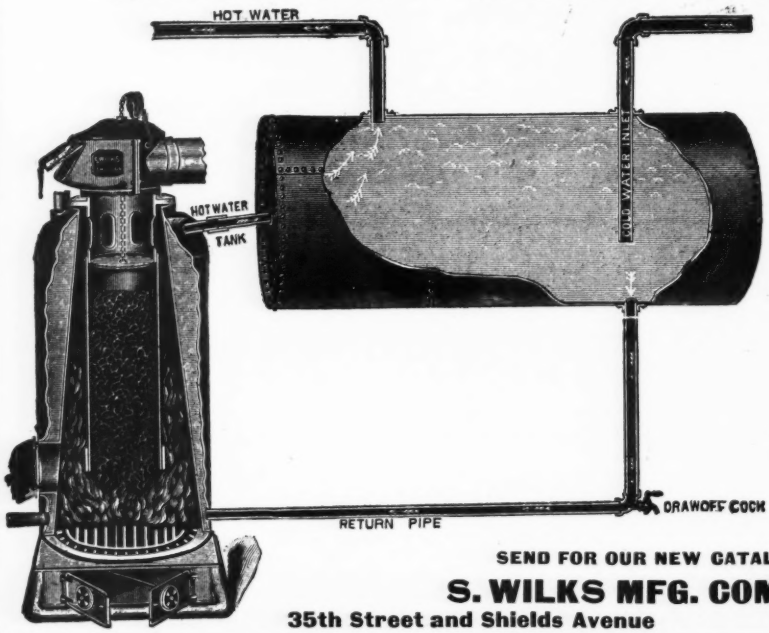
HEATERS

ALWAYS THE BEST

WILKS HOT WATER HEATERS



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Let Us Show You

where we have most boilers cinched. The actual circumference of our corrugated 18 inch fire pot is 74 inches, while the circumference of a plain surface fire box is but 56½ inches. See the point? It's only one of the reasons why "Eclipse" boilers are better, but it is a corking good one.

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Our 44 Page Steam Specialties Book FREE.

We supply BOILERS, RADIATION, STEAM and PLUMBING GOODS for the job complete.

The John Davis Company

CHICAGO

This is No. 2.
Height 36 inches.
Diameter 12 "
Shipping weight 80 pounds.
Net weight 50 lbs.
The products of combustion are entirely separate from the water.
Entire water surfaces are tinned.
Price $35.00.

HOT WATER

FOR BATHROOM AND KITCHEN

is most easily, quickly and economically supplied by a

Humphrey Crescent Instantaneous Water Heater.

Prices range from $20 to $45. **Every Heater GUARANTEED.**

Every progressive PLUMBER should handle them. Send today for catalogue and discounts, to

HUMPHREY CO.

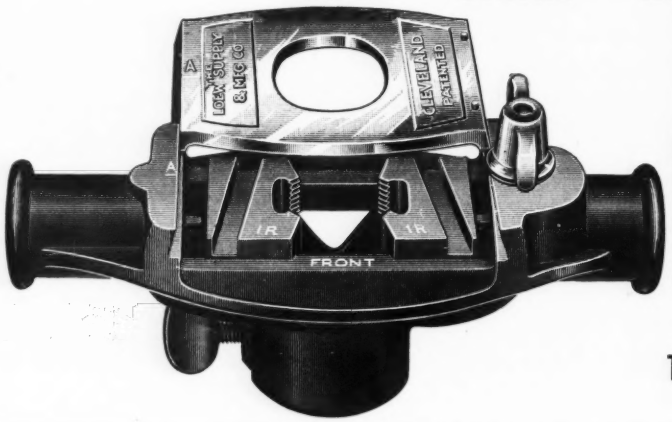
Kalamazoo, Mich.

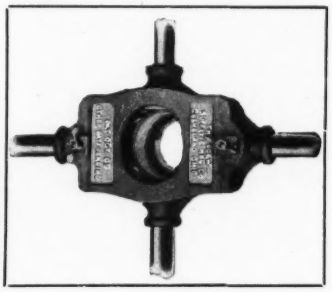
The only manufacturers in the World of a COMPLETE LINE OF INSTANTANEOUS WATER HEATERS.

THE "LOEW" ADJUSTABLE DIE STOCK.

No wrench necessary—can be adjusted to any size pipe in ten seconds or less. Quick opening dies, can be lifted instead of backed off of pipe, saving at least 33⅓ per cent of time required when solid dies are used.

SIMPLE STRONG RAPID





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The Loew Supply & Mfg. Co.
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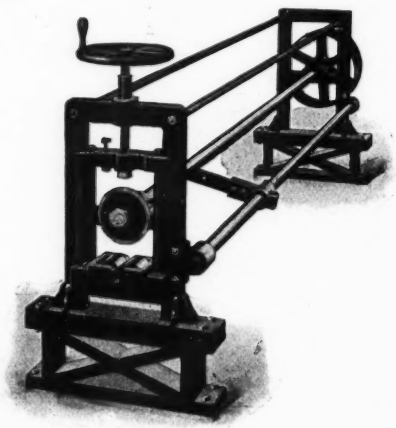
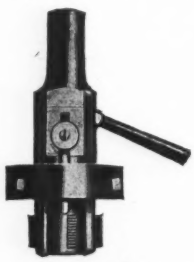
Our Roller Pipe Cutter

is absolutely the best machine on the market for rapid cutting of pipe from ⅛ to 2 inches; it is fitted with either lever attachment or hand wheel and quick acting screw motion; and will cut off pipe for close nipples to pieces nine feet long. It has hardened tool steel rollers, running on hardened steel pins. The cutting-off knife is of best tool steel, carefully tempered. The gauge bar runs the whole length of machine and has an additional adjustable clamp easily set for different lengths of pipe. Tight and loose pulleys on each machine. Built right; sold right; work right. New catalogue and price list on request.

We also make the Murchey nipple and pipe threading machines.





The Murchey Collapsible Tap and Reamer.

Kenneth Anderson Mfg. Co.

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THE NYE DIE

"EASY CUTTER"

The difference is in the teeth

All other dies use four or five chasers, each bearing a full set of teeth. *Only the front teeth cut;* so in our die we omit all the unnecessary back teeth with their attendant friction and binding.

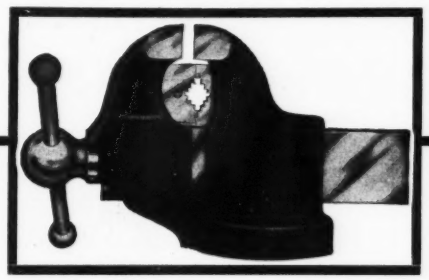
This is why a boy can cut threads

on a two inch pipe with our die and can not with any other.

Your jobber probably keeps the "Nye" die, if not he knows where to get them, if he won't get them for you write us.

Made from Sanderson's best genuine tool steel.

THE NYE TOOL & MACHINE WORKS
196-198 South Clinton Street, - - CHICAGO, ILLINOIS



Reed Vises are for Long Service and Rough Usage.

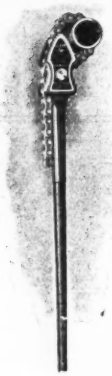
But this doesn't mean that we make them roughly or that they're made for rough usage only—because they're not. They're made with the utmost care and of the very best material, with the result that they're adapted to the finest kind of work in addition to being strong enough for the heaviest. We guarantee them with a guarantee which means something. Catalogue "D" will tell you all about this as well as a lot of other tools for Plumbers and Steamfitters.

Reed Manufacturing Company, Erie, Pa., U. S. A.

MENTION DOMESTIC ENGINEERING

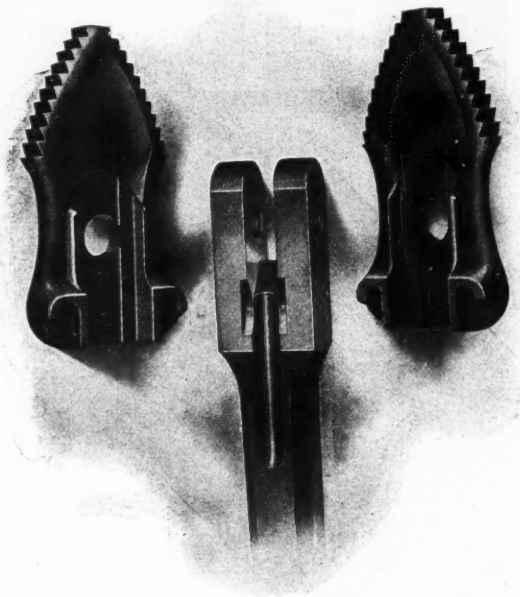
The Head End

Vulcan Chain Pipe Vises are going, going, going!



The "Lids are Off" Mr. Pipefitter! Just look in and satisfy yourself forever.

Man never did nor will, by use or abuse, break the powerful connections of jaws to handle. Like its peerless chains, it's a VULCAN CHAIN PIPE WRENCH point worth remembering No other tool can combine all of the effective mechanical principles of the Vulcan.



J. H. Williams & Co.

Drop-forgings only

Stock carried in
BROOKLYN—NEW YORK
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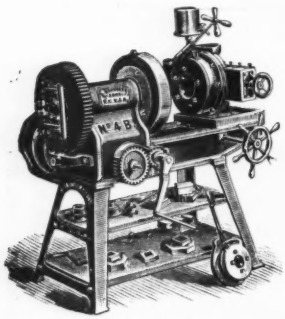
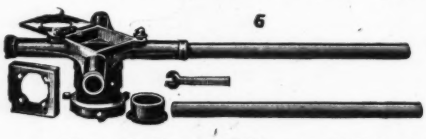
SAUNDERS the STANDARD

The claim of many makers is: "As good as Saunders". Get the standard at first by buying the Saunders tools.



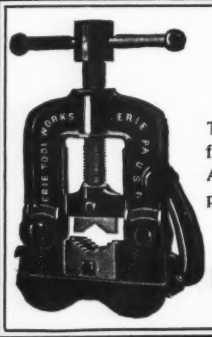
No. 4-B. Pipe Cutting and Threading Machine, ½ in. to 4 in. Hand or Power.



Our stocks and dies are light, strong and of superior design and finish. Send for catalogue.

We make Pipe Cutting and Threading Machines to cut and thread up to 18 inches O. D.

D. SAUNDERS' SONS, 35 Atherton St., YONKERS, N. Y.



Malleable Iron Pipe Vises

The most complete line of hinged frame malleable pipe vises made. All steel kit pipe vises. Open frame pipe vises.

Jobbing Trade Only

ERIE TOOL WORKS
ERIE, PA.

The Franklin Pipe Wrench

SIMPLEST—STRONGEST—BEST
WILL NOT LOCK OR JAM

FULL LINE OF STEAM GOODS.
Manufactured by

OIL WELL SUPPLY CO

PITTSBURGH, PA.
ASK FOR PRICES

READ THE ADVERTISEMENTS

BULLARD

WRENCHES

should convince any user of their great superiority. Only one wrench needed for pipe or nut work. Gives more pull per pound of muscular strength exerted than any wrench on the market. Try the cleverest thing offered to you lately. Ask for free booklet.

Bullard Automatic Wrench Co.

Office & Factory: 257 W. Exchange St , Providence, R. I.

Buy the Trimo

Gold Medal, St. Louis, 1904.

Here are a few good reasons for so doing:

The jaws are drop-forged from the best steel, and carefully tempered and tested before leaving the works.

No need to waste time and money resharpening the teeth—when dull, the inserted jaw can be quickly and cheaply replaced.

Material and workmanship are of the best throughout. We guarantee every TRIMO tool in all respects, and stand by our guarantee.

Lastly, prices are right.

Let us hear from you.
Or ask your dealer.

Trimont Mfg. Co.

Dept. A. ROXBURY, MASS.

"Always buy the best."

SWING CHECK VALVES

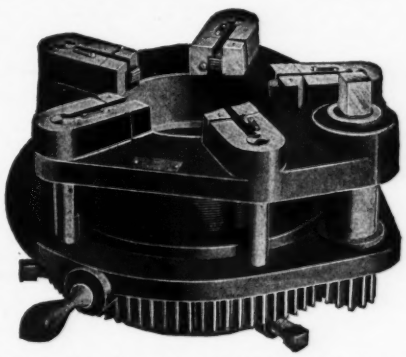
They are Guaranteed

Send for Catalogue

The D. T. Williams Valve Co.

CINCINNATI, O.

"Toledo" Pipe Threader



No. 3, List $300. Threads Pipe from 4½ inch to 8 inch inclusive.

ONE MAN CAN EASILY THREAD ANY SIZE THE TOOL WILL CUT.
LIBERAL DISCOUNTS GIVEN
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The Toledo Pipe Threading Machine Co.

Toledo, Ohio, U. S. A.

MENTION DOMESTIC ENGINEERING

Can a Boy Cut Straight Threads?

Certainly with the ***Keystone*** Die Stock he can; he couldn't help it. And a good mechanic does love straight threads.

Any die fits it; strong, durable, absolutely centers the pipe, making a bad thread impossible. Get our priee.

KEYSTONE DIE STOCK CO.
4709 Halsted Street, Chicago, Ill.

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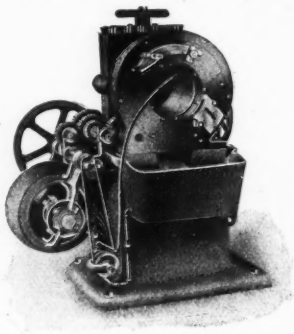


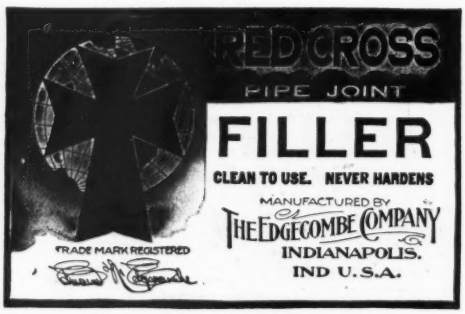
Regular combination hand and power having motor attached, made for any current, to run right and left; our price includes motor, oil pump, etc. and machine is ready to attach to wires.

MADE IN FOUR SIZES

We also make this same machine directly connected to upright marine engine; made in two sizes. There is no work demanded of pipe threading and cutting tools our superior machines are not fitted to do. Get our bulletins.

THE MERRELL MFG. CO.,
TOLEDO, O., U. S. A.

YOU AIM FOR SUCCESS



OUR WARRANT IS ON EVERY CAN.

BUT,—Do you realize that to attain it you *must* take advantage of *improved methods?*

They are the result of study, and to *ignore* them, or stick to *good old methods,* is the road that leads to a *back number* and a *departed trade.*

RED CROSS FILLER makes a perfect joint *because—it* fills *every* crevice in the joint with a material which is as durable as the iron itself.

Our *Standing Proposition* to ship *a trial order* to *any responsible party* on thirty days' trial and approval, with the understanding that if *it does not do all* we claim for it they *need not pay a penny* for it, has put it into use from the *Atlantic* to the *Pacific.* It has accomplished results *never* attained before and when you use it you are *sure* of three things.

First—*The joint will be tight when made.* Second—*It will remain tight.* Third—*It can be taken apart easily at any time without injury to pipe or fittings.*

It costs you nothing to secure these advantages, as Red Cross is sold as low as any good material, but *remember* that there is no JUST AS GOOD. Sample and literature *free* for the asking. Write for it *today.*

Address THE EDGECOMBE CO., Indianapolis, Ind.
Dept. D. Box 483.

They ALL have it. The following General Agents supply the Jobbing and Consuming trade. New England Lubricant Co., 35 Oliver St., Boston; McMann & Taylor, 104-6 John St., New York; Haines, Jones & Cadbury Co., Philadelphia and Savannah; Kellogg & Stokes Stove Co., Denver. You will also find it in stock with the following firms: The Plimpton & Hills Corporation, Hartford, Conn; The Sanitary Co. and McIntosh Hardware Corporation, Cleveland, Ohio; The Columbus Brass Co. and Scioto Valley Supply Co., Columbus, Ohio; The Park & McKay Co. and James Walker & Son, Detroit, Mich.; The Knapp Supply Co., Union City, Ind.; The Central Supply Co., Indianapolis, Ind.; The Mulford Heater Co., Galva, Ill., and H. T. Terrell, 1512 Paloma St., Los Angeles, Cal.

If you are where you cannot obtain it readily, write us direct.

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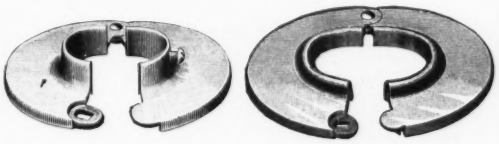
Ceiling and Floor Plates



Regular A. J. Beaton Plates and other varieties. All copper plated before being nickel plated. Seven different patterns of set screw and spring plates from 3/8 inch size to 8 inches.

Send for Catalog and Prices.
The Old Original Company.

The Beaton & Corbin Mfg. Co.
SOUTHINGTON, CONN., U. S. A.

Famous Imperial Boilers

"IMPERIAL"

We want every steamfitter to have our new catalogue of Imperial Boilers—and learn all about this wonderful line of Sectional and Round Steam and Hot Water Boilers. There are no better boilers made at any price. Send for catalogue to-day. : : : : : :

Utica Heater Co., Utica, N. Y.

Chicago Representatives,
Chicago Heater & Supply Co., 56 Dearborn St., Chicago, Ill.

Slip Nipples

ZINC COATED STEEL

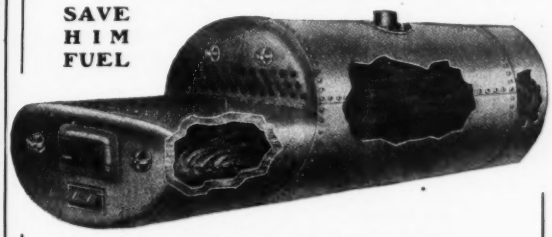
Rust-proof; impervious to distilled water; not affected by electrolysis; all true to size; elastic; adaptable to variations in boring castings; for connecting **RADIATORS AND HEATING BOILERS** positively best method known. SAMPLES FREE to interested persons.

The Pratt Chuck Co., Frankfort, N. Y.

It's the Second Job

you get from the same man that proves your worth, and you can get it if you

SAVE HIM FUEL



We think these steel heating boilers, "The Invincible" and "The Eclipse" save about 50 per cent in fuel usually burned in cast iron heaters.

Best flange steel. Internally fired. Easily accessible. No brick work absorbs heat. No cast iron sections to crack. No joints to repack. Complete and ready to set up on leaving our works. Any kind of fuel successfully used. All sizes in stock. Prompt deliveries. For catalog, prices, discounts and testimonials, address

BURNS BOILER & MFG. CO.,
Established 1863. WEST DE PERE, WIS.

We also carry a full line of Standard Fire Box and Tubular Boilers.
GET OUR PRICES.

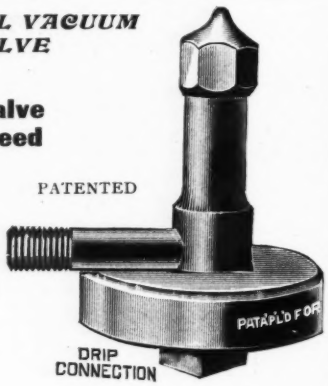
MENTION DOMESTIC ENGINEERING

The New D&R Vacuum Radiator Air Valve

THE REAL VACUUM VALVE

Every Valve Guaranteed

PATENTED



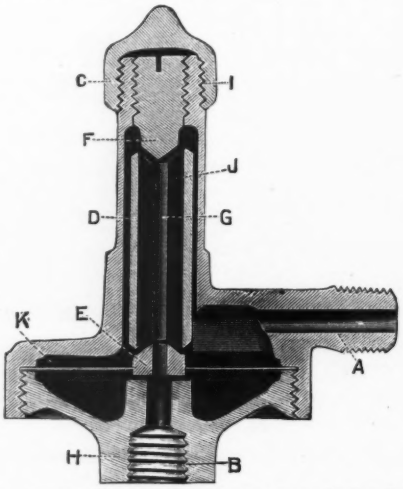
Composition expansion post enclosed in brass tube, cannnot buckle.

Has no springs. Operated by thermostatic action of expansion post and atmospheric pressure. Used with or without drip pipe.

Produces perfect vacuum on any tight gravity system. Heats the most stubborn radiator when used individually.

Gives larger profit to the fitter and greater satisfaction to his customer.

Costs no more than good automatic valves.



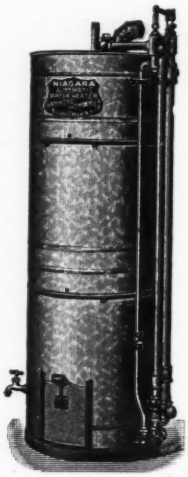
A—Connection to radiator. *B*—Drip pipe connection. *C*—Cap. *D*—Brass casing of thermostat, preventing any bending or change in form of composition thermostat. *E*—Lower valve seat on diaphragm. *F*—Adjusting screw and upper valve seat. *G*—Longitudinal hole through center of thermostat. *H*—Base plate of valve. *I*—Thread of cap. *J*—Composition thermostat. *K*—Copper diaphragm.

SAMPLE GLADLY SUBMITTED

Address

The Davis & Roesch Temperature Controlling Co., NEWARK, N. J.

NIAGARA Automatic Water Heater



USES NATURAL OR ARTIFICIAL GAS

Put it in the basement, connect it like a range boiler, and it will keep a supply of hot water on hand for instant use all summer with absolutely no attention. There isn't a thing the plumber sells which has so many good talking points. Write for details.

Hammond-Homberger Co.,
SILVER CREEK, N. Y.

PITTSBURGH VALVE & FITTINGS COMPANY

GENERAL OFFICE
FRICK BUILDING,
PITTSBURG, PA.

MANUFACTURERS OF

Fittings, Valves, Cocks, etc.

Works, Barberton, Ohio

ADDRESS ALL COMMUNICATIONS TO THE GENERAL OFFICE.

Pittsburgh, Pa.

READ THE ADVERTISEMENTS

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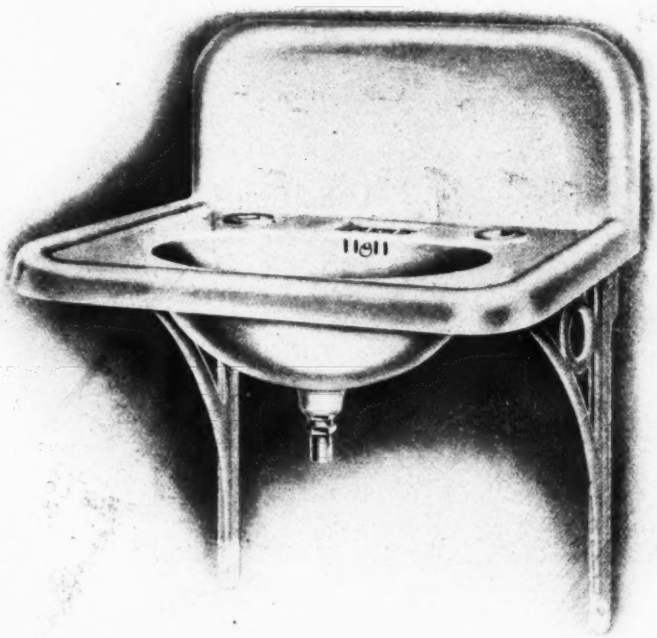


C 266.

This is a great favorite with our trade. Are you acquainted with it? If not, we would like to introduce it to you.

Description and Dimensions:

Countersunk Slab, 18x24 inches with 2-inch roll rim. Height of back, 10 inches; 12x15 P. O. M. P. basin.

Includes N. P. overflow strainer, waste plug, rubber stopper, chain stay and brackets, as shown. Can also be furnished with concealed brackets.

List, enameled inside and painted iron brackets	$11.50
List, enameled all over and enameled iron brackets	14.25
Size, 20x24, enameled inside and enameled iron brackets	13.50
Size, 20x24, enameled all over and enameled iron brackets	16.50

If legs are wanted instead of brackets, add to list for painted $1.50; for enameled $2.00.

Ask for our new catalogue of Enameled Iron Lavatories.

We handle everything in Plumbing, Gas, Steam and Water Supplies.

SANITARY SPECIALTY MFG. CO.

24 to 30 Milwaukee Ave. CHICAGO 55 to 57 N. Clinton St.

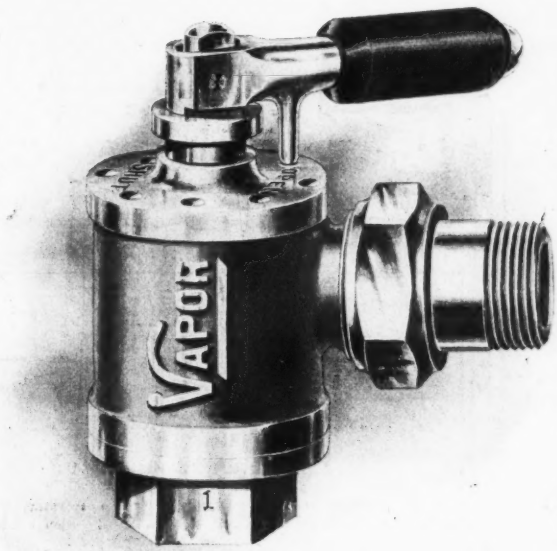
Phones Main 1816 and 1817

Come to Chicago, see our stock, and personally make your selections.

MENTION DOMESTIC ENGINEERING

READ THE ADVERTISEMENTS

WHAT IS VAPOR HEATING?



It is heating by the vapor arising from boiling water not under pressure, the temperature of the water never exceeding 212 degrees.

Its superiority over ordinary steam and hot water systems is so great that we have compiled a pamphlet especially to show it.

Installed by you, your reputation will be that of the most advanced, scientific heating engineer, because it is the farthest advanced heating system known. You probably have a job where we can assist you in installing our systems. At any rate, write us.

E. H. DOW, Omaha, Neb.

Manager Western Office
Vapor Heating Company.

SWADKINS'
"S"
Eccentric Reducers

NOTICE

Are most uniform with square beads and chased threads

LIST, WITH DISCOUNTS, ON APPLICATION

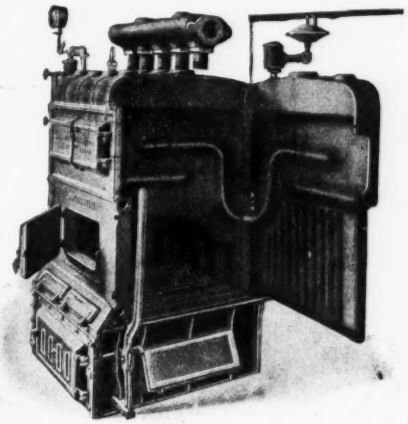
Eccentric Tees and Ells

NET PRICES

W. F. SWADKINS

143-145-147 Fulton Street, Chicago, Ill.

Don't Deceive Yourselves



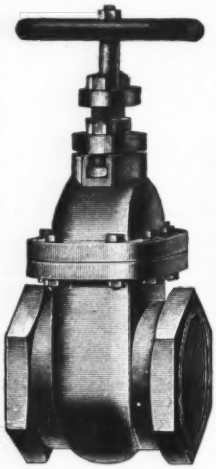
You know a boiler with outside connections, which can be got at for repairs without drawing the fire, or moving out of the house on a cold day, is much superior to the kind that you can't repair at all without putting the system out of business. Ask for prices.

Prudential Heating Co., Akron, O.

MAKERS OF AMERICA'S BEST BOILERS

MENTION DOMESTIC ENGINEERING

HARVEY'S



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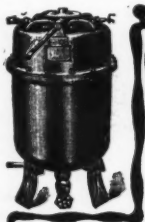
Discs interchangeable. Can be packed either opened or closed. Full weight, first-class material, superior finish. Made in Brass and in Iron Body, both screwed and flanged. Bell ends. Rising stem and yoke. Standard, medium or extra heavy. For water, steam, gas or oil.

Send for Circular.

A. HARVEY'S SONS MFG. CO., Ltd.

Manufacturers of Steam, Gas and Plumbing Goods.

Detroit, Mich.



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Residences, Apartment Buildings, Hotels, Cafes, Institutions, etc.—Entire Supply

LYNN FILTERS

PURE CLEAR WATER

The Lynn Filter Mfg. Co.

Cincinnati, Ohio.

NEW YORK CHICAGO ST. LOUIS

The Peerless

WATER HEATER

solves the hot water problem.

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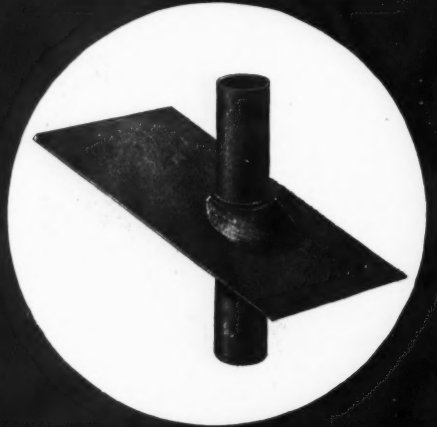
PEERLESS KITCHEN BOILER & SUPPLY CO.

35-37 Randolph Street, Chicago

Telephone Central 1840.

BACKED BY OUR WORD THE EUREKA



12 oz. copper—Fits any roof—Used 12 years—Never had a complaint—Never leaks—Indestructible—No tools to apply.

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EUREKA ROOF JOINT COMPANY

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MASON WORK

SUCH AS

Steam Boiler Setting

AND

Engine Foundations

All kinds of Furnaces

General repairing promptly attended to—Estimates furnished on application.

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Telephone Canal 6643.

Johnson's Handy Manual

contains hundreds of valuable hints and short cuts to lighten the labor of the plumber and fitter. ¶ Tells how to ascertain the length of pipe required in 45 deg. angles; how to take measurements of pipes and fittings; how to determine exposure and proportion radiation; the proper method of taking off connections in steam and hot water piping, etc. **Price $1.00.**

DOMESTIC ENGINEERING,

58-64 N. Jefferson Street, **CHICAGO.**

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Let Us Show You

where we have most boilers cinched. The actual circumference of our corrugated 18 inch fire pot is 74 inches, while the circumference of a plain surface fire box is but 56½ inches. See the point? It's only one of the reasons why "Eclipse" boilers are better, but it is a corking good one.

ASK FOR BOOKLET

Our 44 Page Steam Specialties Book FREE.

We supply BOILERS, RADIATION, STEAM and PLUMBING GOODS for the job complete.

The John Davis Company

CHICAGO

This is No. 2.
Height 36 inches.
Diameter 12 "
Shipping weight 80 pounds.
Net weight 50 lbs.
The products of combustion are entirely separate from the water.
Entire water surfaces are tinned.
Price $35.00.

HOT WATER

FOR BATHROOM AND KITCHEN

is most easily, quickly and economically supplied by a

Humphrey Crescent

Instantaneous Water Heater.

Prices range from $20 to $45. **Every Heater GUARANTEED.**

Every progressive PLUMBER should handle them. Send today for catalogue and discounts, to

HUMPHREY CO.

Kalamazoo, Mich.

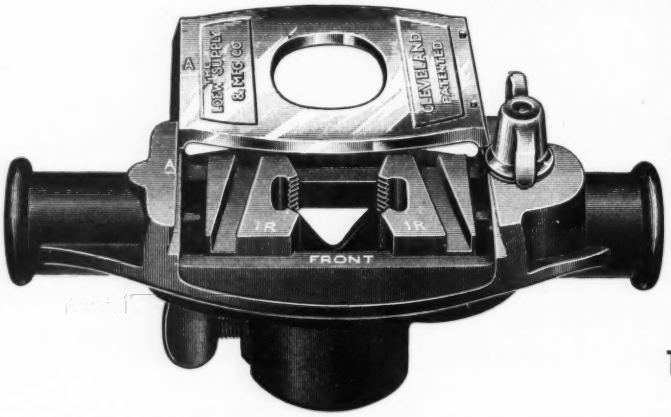
The only manufacturers in the World of a COMPLETE LINE OF INSTANTANEOUS WATER HEATERS.

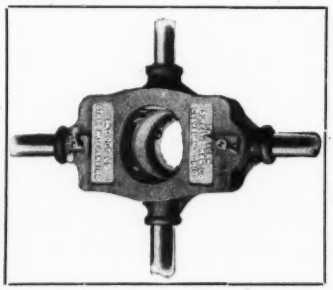
MENTION DOMESTIC ENGINEERING

THE "LOEW" ADJUSTABLE DIE STOCK.

No wrench necessary—can be adjusted to any size pipe in ten seconds or less. Quick opening dies, can be lifted instead of backed off of pipe, saving at least 33⅓ per cent of time required when solid dies are used.

SIMPLE STRONG RAPID





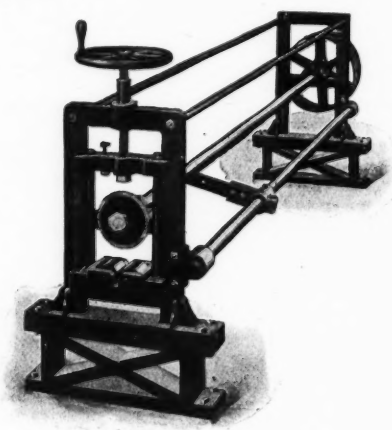
Catalog "GD" mailed on request.

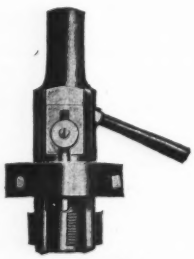
The Loew Supply & Mfg. Co.
CLEVELAND, OHIO.

Our Roller Pipe Cutter

is absolutely the best machine on the market for rapid cutting of pipe from ⅛ to 2 inches; it is fitted with either lever attachment or hand wheel and quick acting screw motion; and will cut off pipe for close nipples to pieces nine feet long. It has hardened tool steel rollers, running on hardened steel pins. The cutting-off knife is of best tool steel, carefully tempered. The gauge bar runs the whole length of machine and has an additional adjustable clamp easily set for different lengths of pipe. Tight and loose pulleys on each machine. Built right; sold right; work right. New catalogue and price list on request.

We also make the Murchey nipple and pipe threading machines.





The Murchey Collapsible Tap and Reamer.

Kenneth Anderson Mfg. Co.
33-37 Atwater Street **DETROIT, MICH.**

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THE NYE DIE

"EASY CUTTER"

The difference is in the teeth

All other dies use four or five chasers, each bearing a full set of teeth. *Only the front teeth cut;* so in our die we omit all the unnecessary back teeth with their attendant friction and binding.

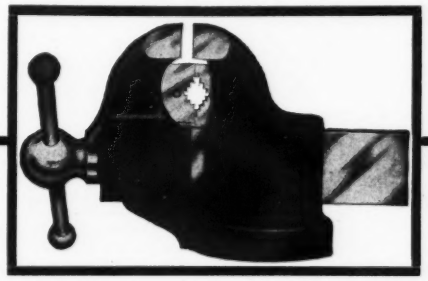
This is why a boy can cut threads

on a two inch pipe with our die and can not with any other.

Your jobber probably keeps the "Nye" die, if not he knows where to get them, if he won't get them for you write us.

Made from Sanderson's best genuine tool steel.

THE NYE TOOL & MACHINE WORKS
196-198 South Clinton Street, - - CHICAGO, ILLINOIS



Reed Vises are for Long Service and Rough Usage.

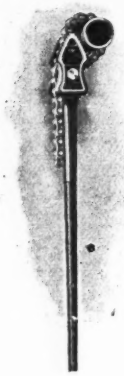
But this doesn't mean that we make them roughly or that they're made for rough usage only—because they're not. They're made with the utmost care and of the very best material, with the result that they're adapted to the finest kind of work in addition to being strong enough for the heaviest. We guarantee them with a guarantee which means something. Catalogue "D" will tell you all about this as well as a lot of other tools for Plumbers and Steamfitters.

Reed Manufacturing Company, Erie, Pa., U. S. A.

MENTION DOMESTIC ENGINEERING

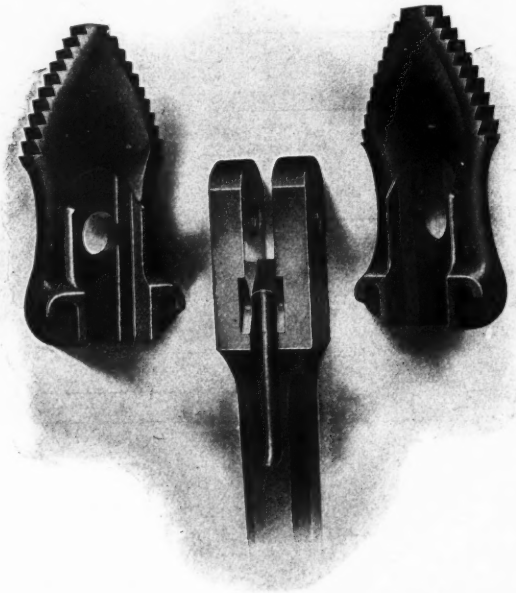
The Head End

Vulcan Chain Pipe Vises are going, going, going!



The "Lids are Off" Mr. Pipefitter! Just look in and satisfy yourself forever.

Man never did nor will, by use or abuse, break the powerful connections of jaws to handle. Like its peerless chains, it's a VULCAN CHAIN PIPE WRENCH point worth remembering No other tool can combine all of the effective mechanical principles of the Vulcan.



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Drop-forgings only

Stock carried in
BROOKLYN—NEW YORK
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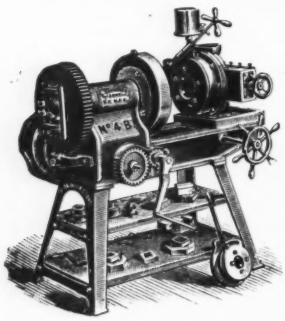
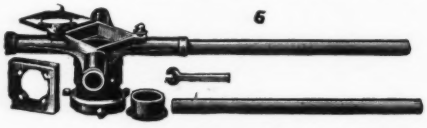
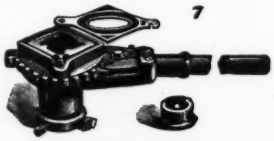
SAUNDERS the STANDARD

The claim of many makers is: "As good as Saunders". Get the standard at first by buying the Saunders tools.



No. 4-B. Pipe Cutting and Threading Machine, ⅛ in. to 4 in. Hand or Power.

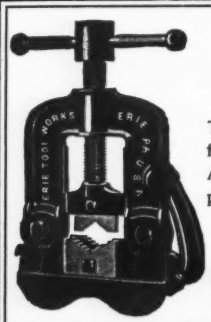




Our stocks and dies are light, strong and of superior design and finish. Send for catalogue.

We make Pipe Cutting and Threading Machines to cut and thread up to 18 inches O. D.

D. SAUNDERS' SONS, 35 Atherton St., YONKERS, N. Y.



Malleable Iron Pipe Vises

The most complete line of hinged frame malleable pipe vises made. All steel kit pipe vises. Open frame pipe vises.

Jobbing Trade Only

ERIE TOOL WORKS
ERIE, PA.

The Franklin Pipe Wrench

SIMPLEST—STRONGEST—BEST
WILL NOT LOCK OR JAM

FULL LINE OF STEAM GOODS.
Manufactured by

OIL WELL SUPPLY CO

PITTSBURGH, PA.

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BULLARD

WRENCHES

should convince any user of their great superiority. Only one wrench needed for pipe or nut work. Gives more pull per pound of muscular strength exerted than any wrench on the market. Try the cleverest thing offered to you lately. Ask for free booklet.

Bullard Automatic Wrench Co.

Office & Factory: 257 W. Exchange St , Providence, R. I.

Buy the Trimo

Gold Medal, St. Louis, 1904.

Here are a few good reasons for so doing:

The jaws are drop-forged from the best steel, and carefully tempered and tested before leaving the works.

No need to waste time and money resharpening the teeth—when dull, the inserted jaw can be quickly and cheaply replaced.

Material and workmanship are of the best throughout. We guarantee every TRIMO tool in all respects, and stand by our guarantee.

Lastly, prices are right.

Let us hear from you.
Or ask your dealer.

Trimont Mfg. Co.

Dept. A. ROXBURY, MASS.

"Always buy the best."

SWING CHECK VALVES

They are Guaranteed

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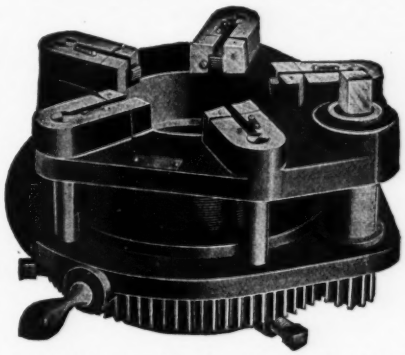
The D. T. Williams Valve Co.

CINCINNATI, O.

"Toledo" Pipe Threader



No. 3. List $300. Threads Pipe from 4½ inch to 8 inch inclusive.

ONE MAN CAN EASILY THREAD ANY SIZE THE TOOL WILL CUT. LIBERAL DISCOUNTS GIVEN

SEND FOR DESCRIPTIVE CATALOGUE

The Toledo Pipe Threading Machine Co.

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Can a Boy Cut Straight Threads?

Certainly with the ***Keystone*** Die Stock he can; he couldn't help it. And a good mechanic does love straight threads.

Any die fits it; strong, durable, absolutely centers the pipe, making a bad thread impossible. Get our priee.

KEYSTONE DIE STOCK CO.
4709 Halsted Street, Chicago, Ill.

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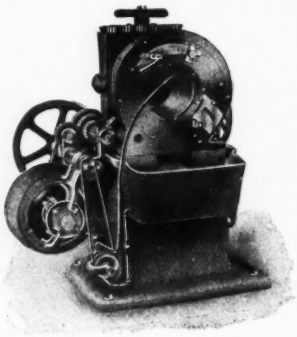


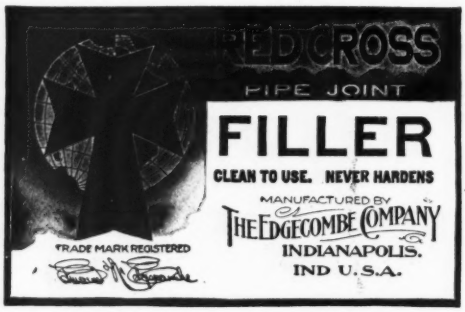
Regular combination hand and power having motor attached, made for any current, to run right and left; our price includes motor, oil pump, etc. and machine is ready to attach to wires.

MADE IN FOUR SIZES

We also make this same machine directly connected to upright marine engine; made in two sizes. There is no work demanded of pipe threading and cutting tools our superior machines are not fitted to do. Get our bulletins.

THE MERRELL MFG. CO.,
TOLEDO, O., U. S. A.

YOU AIM FOR SUCCESS



OUR WARRANT IS ON EVERY CAN.

BUT,—Do you realize that to attain it you *must* take advantage of *improved methods?*

They are the result of study, and to *ignore* them, or stick to *good old methods,* is the road that leads to a *back number* and a *departed trade.*

RED CROSS FILLER makes a perfect joint *because—it* fills *every* crevice in the joint with a material which is as durable as the iron itself.

Our *Standing Proposition* to ship *a trial order* to *any responsible party* on thirty days' trial and approval, with the understanding that if *it does not do all* we claim for it they *need not pay a penny* for it, has put it into use from the *Atlantic* to the *Pacific.* It has accomplished results *never* attained before and when you use it you are *sure* of three things.

First—*The joint will be tight when made.* Second—*It will remain tight.* Third—*It can be taken apart easily at any time without injury to pipe or fittings.*

It costs you nothing to secure these advantages, as Red Cross is sold as low as any good material, but *remember* that there is no JUST AS GOOD. Sample and literature *free* for the asking. Write for it *today.*

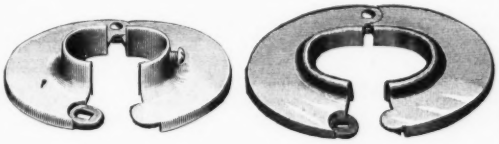
Address THE EDGECOMBE CO., Indianapolis, Ind.
Dept. D. Box 483.

They ALL have it. The following General Agents supply the Jobbing and Consuming trade. New England Lubricant Co., 35 Oliver St., Boston; McMann & Taylor, 104-6 John St., New York; Haines, Jones & Cadbury Co., Philadelphia and Savannah; Kellogg & Stokes Stove Co., Denver. You will also find it in stock with the following firms: The Plimpton & Hills Corporation, Hartford, Conn; The Sanitary Co. and McIntosh Hardware Corporation, Cleveland, Ohio; The Columbus Brass Co. and Scioto Valley Supply Co., Columbus, Ohio; The Park & McKay Co. and James Walker & Son, Detroit, Mich.; The Knapp Supply Co., Union City, Ind.; The Central Supply Co., Indianapolis, Ind.; The Mulford Heater Co., Galva, Ill., and H. T. Terrell, 1512 Paloma St., Los Angeles, Cal.

If you are where you cannot obtain it readily, write us direct.

READ THE ADVERTISEMENTS

Ceiling and Floor Plates



Regular A. J. Beaton Plates and other varieties. All copper plated before being nickel plated. Seven different patterns of set screw and spring plates from 3/8 inch size to 8 inches.

Send for Catalog and Prices.
The Old Original Company.

The Beaton & Corbin Mfg. Co.
SOUTHINGTON, CONN., U. S. A.

Famous Imperial Boilers

"IMPERIAL"

We want every steamfitter to have our new catalogue of Imperial Boilers—and learn all about this wonderful line of Sectional and Round Steam and Hot Water Boilers. There are no better boilers made at any price. Send for catalogue to-day. : : : : : :

Utica Heater Co., Utica, N. Y.

Chicago Representatives,
Chicago Heater & Supply Co., 56 Dearborn St., Chicago, Ill.

Slip Nipples

ZINC COATED STEEL

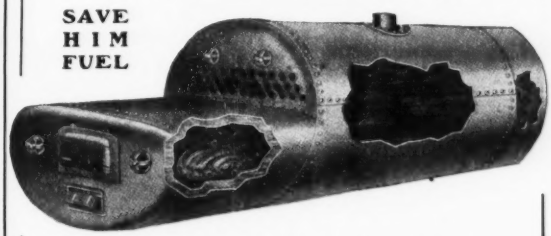
Rust-proof; impervious to distilled water; not affected by electrolysis; all true to size; elastic; adaptable to variations in boring castings; for connecting **RADIATORS AND HEATING BOILERS** positively best method known. SAMPLES FREE to interested persons.

The Pratt Chuck Co., Frankfort, N. Y.

It's the Second Job

you get from the same man that proves your worth, and you can get it if you

SAVE HIM FUEL



We think these steel heating boilers, "The Invincible" and "The Eclipse" save about 50 per cent in fuel usually burned in cast iron heaters.

Best flange steel. Internally fired. Easily accessible. No brick work absorbs heat. No cast iron sections to crack. No joints to repack. Complete and ready to set up on leaving our works. Any kind of fuel successfully used. All sizes in stock. Prompt deliveries. For catalog, prices, discounts and testimonials, address

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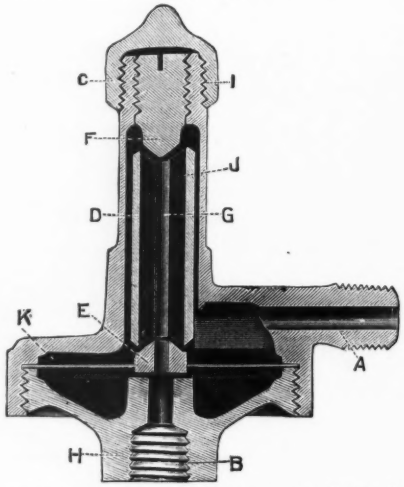

A—Connection to radiator. *B*—Drip pipe connection. *C*—Cap. *D*—Brass casing of thermostat, preventing any bending or change in form of composition thermostat. *E*—Lower valve seat on diaphragm. *F*—Adjusting screw and upper valve seat. *G*—Longitudinal hole through center of thermostat. *H*—Base plate of valve. *I*—Thread of cap. *J*—Composition thermostat. *K*—Copper diaphragm.

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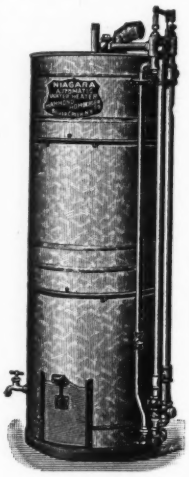

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NOTES ON HEATING AND VENTILATION.

A series of articles on the design and installation of heating and ventilating systems with reference to efficiency and economy in operation. These observations are based both upon laboratory experiments and upon the actual experience of the author in the field of engineering practice.

By John R. Allen.

Junior Professor of Mechanical Engineering, University of Michigan.

(Continued)

Disc fans are used where the resistance to be overcome is very slight or in cases where the ducts are very large, with easy turns and of very short length.

Disc Fans. They are extensively used for exhausting the air from the vent flues and where the vent flues are short and large they give good satisfaction. The capacity, speed and horsepower of various sizes of disc fans is shown in Table 30.

Example.—As an example of the fan system consider an auditorium. The dimensions of the room are 40 feet 9 inches by 79 feet 6 inches by 127 feet 9 inches. The volume of the room is 444,330 cubic feet. It has 203 square feet of glass surface and 5,441 square feet of wall surface. The heat lost from the room, figuring in the same way as we have for previous examples, will be 168,-010 B. T. U's. The hall has a seating capacity of 2,500 persons. Allowing 2,000 cubic feet of air per person, the necessary air to be admitted to the room would be 5,000,-000 cubic feet of air per minute. This would be 383,000 pounds. In order to heat the room with this quantity of air entering, it will be necessary to heat the air but a fraction of a degree so that the air admitted to the room for ventilating purposes will be far more than that necessary for heating purposes. It is best, then, to figure on admitting air only for purposes of ventilation. To heat this air from zero to 70° would require 383,000×.2375×70 =6,353,000 B. T. U's. Referring to Table 27, we see that a heater coil 12 pipes deep will heat air having a velocity of 1,250 feet per minute to a temperature of 82°, which is probably about the proper assumption to make in this case. The coil would condense 2.1 pounds of steam per square foot per hour. Each pound would give up about 970 heat units, so that each square foot of heater coil will give off about 2,000 B. T. U's per hour. Then the number of square feet of heater coil required would be 6,350,000÷2,000=3,175 square feet. The heater coils are usually made of 1-inch pipe and each square foot of surface is equivalent to about 3 feet of 1-inch heater pipe, hence there will be required 3,175×3 or 9,525 feet of 1-inch pipe in the heater coils. The air to be admitted to the hall is 6,350,000 cubic feet per hour or 106,000 feet per minute. The usual velocity allowed for the air passing through the heater coil is 1,200 feet per minute. This would require an air area in the heater coil of 106,000÷1,200=88 square feet. The area in the various heater coils will be found in the blower company's catalogues

Table 30.

Disc Ventilating Fan—Capacities, Speeds and Horse Powers. (American Blower Co.)

Air Velocity in Ft. per Min.	Size Fan		18	21	24	30	36	42	48	54	60	72	84	96	108	120
600	Free	Cu. Ft. R. P. M. H. P.	1060 327 .016	1440 280 .022	1880 245 .028	2940 196 .042	4230 169 .064	5770 149 .087	7536 133 .113	9540 119 .143	11770 98 .177	16960 82 .253	23090 70 .345	30156 62 .450	38160 55 .571	47160 50 .706
	Heater	R. P. M. H. P.	530 .053	453 .072	396 .094	317 .147	265 .212	227 .288	197 .377	178 .477	158 .590	132 .849	113 1.15	100 1.51	89 1.91	81 2.35
700	Free	Cu. Ft. R. P. M. H. P.	1235 320 .025	1680 328 .035	2200 280 .045	3400 230 .070	4940 190 .100	6730 164 .136	8800 145 .178	11120 127 .227	13750 112 .282	19760 96 .402	26930 82 .548	35106 72 .720	44520 62 .905	55000 58 1.11
	Heater	R. P. M. H. P.	600 .071	530 .096	458 .126	372 .196	307 .283	266 .384	234 .503	206 .636	178 .786	158 1.13	132 1.54	116 2.10	106 2.52	92 3.14
800	Free	Cu. Ft. R. P. M. H. P.	1410 435 .036	1920 373 .048	2510 306 .068	3820 262 .098	5630 215 .142	7700 187 .192	10300 164 .251	12710 145 .323	15720 128 .402	22600 110 .574	30400 94 .783	40150 83 1.04	50900 73 1.32	64800 66 1.67
	Heater	R. P. M. H. P.	705 .106	604 .149	527 .189	424 .294	353 .424	302 .576	265 .755	234 .957	212 1.18	178 1.71	152 2.32	134 3.00	118 3.81	107 4.73
900	Free	Cu. Ft. R. P. M. H. P.	1584 490 .048	2160 405 .065	2826 360 .085	4410 263 .132	6354 240 .190	8650 210 .258	11304 184 .338	14310 163 .436	17667 144 .543	25443 123 .774	34647 106 1.04	45234 93 1.35	57200 82 1.72	70650 74 2.12
	Heater	R. P. M. H. P.	792 .143	770 .195	595 .254	464 .397	398 .572	340 .780	298 1.02	265 1.29	236 1.59	199 2.29	173 3.12	150 4.07	132 5.15	119 6.36
1000	Free	Cu. Ft. R. P. M. H. P.	1770 545 .057	2400 450 .080	3140 400 .104	4900 292 .164	7060 266 .233	9610 234 .322	12556 205 .421	15900 181 .540	19630 160 .677	28270 136 .967	38480 120 1.29	50095 103 1.68	63600 91 2.09	78540 82 2.56
	Heater	R. P. M. H. P.	883 .204	760 .276	657 .362	530 .563	445 .814	378 1.11	332 1.45	293 1.83	268 2.26	220 3.26	194 4.44	167 5.77	147 7.33	132 9.05
1200	Free	Cu. Ft. R. P. M. H. P.	2122 654 .102	2880 540 .138	3768 480 .180	5880 350 .280	8472 320 .405	11541 280 .560	15072 245 .746	19100 218 .960	23556 192 1.213	33900 163 1.82	46176 144 2.60	60324 124 3.52	76320 110 4.63	94240 98 5.90
	Heater	R. P. M. H. P.	1059 .300	912 .409	788 .534	636 .832	534 1.20	453 1.64	396 2.14	351 2.70	322 3.37	264 4.81	234 6.61	200 8.63	176 10.8	160 13.3
1400	Free	Cu. Ft. R. P. M. H. P.	2475 767 .133	3360 635 .180	4400 560 .235	6860 410 .365	9870 373 .528	13470 326 .728	17600 286 .972	22270 254 1.25	27500 224 1.58	39600 191 2.37	53900 168 3.39	70350 144 4.50	88950 128 5.77	109500 115 7.39
	Heater	R. P. M. H. P.	1235 .487	1064 .660	919 .864	742 1.35	623 1.95	528 2.64	463 3.46	410 4.38	376 5.40	308 7.80	274 10.6	234 13.8	205 17.5	184 21.6
1600	Free	Cu. Ft. R. P. M. H. P.	2830 875 .185	3830 730 .252	5000 640 .330	7840 470 .525	11300 428 .742	15400 375 1.01	20050 330 1.34	25400 298 1.67	31400 256 2.06	45200 219 2.97	61500 192 4.05	80000 165 5.28	101200 146 6.66	125200 132 8.25
	Heater	R. P. M. H. P.	1412 .736	1216 1.00	1050 1.31	848 2.04	712 2.94	603 4.00	537 5.23	468 6.62	429 8.17	352 11.8	314 16.0	268 20.9	234 26.5	210 32.7
1800	Free	Cu. Ft. R. P. M. H. P.	3170 980 .247	4320 820 .336	5630 720 .440	8850 530 .686	12700 480 .991	17300 420 1.35	22600 368 1.76	28600 335 2.22	35200 288 2.75	51000 246 3.97	69000 216 5.39	90000 185 7.04	114000 163 8.90	141000 148 11.0
	Heater	R. P. M. H. P.	1588 1.05	1368 1.43	1181 1.87	954 2.93	801 4.23	679 5.75	595 7.50	526 9.50	483 11.7	396 16.9	354 23.0	302 30.0	263 38.0	236 47.0
2000	Free	Cu. Ft. R. P. M. H. P.	3520 1090 .316	4800 935 .456	6260 815 .597	9800 655 .931	14120 545 1.34	19240 470 1.83	25120 410 2.39	31800 361 3.02	39160 327 3.73	56820 277 5.38	76960 234 7.31	100520 206 9.55	127200 182 12.1	157200 164 14.9
	Heater	R. P. M. H. P.	1764 2.30	1520 1.77	1312 2.30	1060 3.60	890 5.15	755 7.05	664 9.25	585 11.7	528 14.5	440 20.8	380 28.5	336 37.0	292 46.8	262 57.8
2200	Free	Cu. Ft. R. P. M. H. P.	3850 1200 .424	4300 1050 .576	6800 900 .754	10800 720 1.18	15520 600 1.70	21120 515 2.31	27600 450 3.02	35000 398 3.82	43000 360 4.72	62200 300 6.79	84700 257 9.25	110500 226 12.1	138800 200 15.3	172500 175 18.8
	Heater	R. P. M. H. P.	1940 1.70	1700 2.30	1460 3.00	1163 4.70	972 6.80	831 9.25	727 12.1	645 15.1	582 18.8	485 27.0	415 37.0	368 48.2	323 61.0	284 82.0

and is also given in Table 26. This will determine the size of the heater coil to be used.

On account of the size of the hall and the amount of air introduced, it will be best to have two fans for delivering air into the building. Each fan would then need a capacity of 53,000 cubic feet per minute. In order to overcome the resistance of the flues the pressure should be from .2 to .3 of an ounce at least. From the table of fan capacities we see that a 200-inch fan running at 125 revolutions would require 19.3 horsepowers and produce a pressure of .435 ounces. This, however, is a little higher pressure than would be desired unless the flues were quite long and had a number of curves. If the flues are short and straight we could use two 220-inch fans running at 100 revolutions. These fans would deliver 55,000 cubic feet of air each, with a pressure of .335 ounce and require 17.1 horsepower to drive them. By using a larger size of fan 2.2 horsepowers for each one of the fans would be saved. Assuming the air to be delivered to the hall by four ducts, these ducts being large, it would be reasonable to allow a velocity of 1,500 feet per minute in the duct. Each duct would have to carry 26,000 cubic feet of air per minute; 26,000÷1,500=17.3 square feet in area. As the registers of these ducts will be large and situated well above the head line, it would be safe to allow a velocity of 500 feet per minute to the register. The area of each register, assuming that there are four, entering the room, would be 52 square feet. The vent flues leaving the room should have an area about equal to the hot air flues.

(*To be continued.*)

ARTIFICIAL VENTILATION ON SHIPBOARD.

Among the problems involved in the equipment of a modern ship of war must be included that of adequate ventilation. On the great passenger liners this is naturally an important matter, but it also demands consideration on a battleship or cruiser, especially since these latter are often sent for duty in the tropics, and in any case must be the residences of their occupants for comparatively long periods of time.

Some of the recent experiments which have been made in vessels of the United States navy are discussed in a paper by Naval Constructor D. W. Taylor, published in a recent issue of Engineering News, and some review of the principal points is given.

Rotary fans attached to pipe systems for forced or mechanical ventilation were first fitted on United States vessels by Ericsson on his monitors. They have figured more or less on our naval vessels ever since, even upon the wooden vessels built in the '70s. Until about seven years ago steam fans were used. The earliest vessel to have a complete outfit of electric fans was the Nashville, first commissioned in 1897. For five years or more all ventilating fans have been electrically driven. In the earlier vessels of the new navy, built between 1885 and 1890, it was customary to fit a few large steam fans for ventilating living spaces, and these were so fitted with a system of flap valves that they could be used either as supply or exhaust fans. When such a system, after being run exhausting for some time, was changed to supply air, it blew into the living spaces an astonishing amount of dust which had accumulated in the pipes. At present, while both supply and exhaust systems are fitted, the tendency is to rely mainly on the former and use the latter only for such places as lavatories, water closets, dynamo rooms, steering engine rooms, etc. Probably under conditions on shipboard a supply system requires less power to move a given quantity of air. A distinct advantage is that with single piping fresh air is supplied positively. With an exhaust system the air which takes the place of that exhausted is not necessarily fresh, unless supply pipes are fitted as well as exhaust. The principal practical objection to a supply system of ventilation is that in cold weather it is very difficult to avoid unpleasant draughts from it, and it is apt to be shut off. In the tropics, however, where ventilation is most needed, the cooling currents from a supply system are found grateful and pleasant.

At present, using electric power, a great many more fans are fitted than was customary when steam was used. There are advantages in using a number of separate fans. The piping is simpler and fewer holes in water-tight decks and bulkheads are required. But with steam power the use of a number of small fans would involve a network of steam and exhaust pipes which could not be considered for a moment.

Mr. Taylor describes especially the experiments which have been made on the battleship Missouri, this being a typical example of the ventilating plants on the later battleships, and the extent of this department will be realized when it is understood that on this vessel there are thirty-two fans, requiring motors aggregating 87 horsepower for their operation.

The solution of the problem of supplying a compartment or number of compartments on a ship with fresh air requires the solution of two interdependent problems, which may be stated as below:

1. Given a properly designed system of piping and outlets, with what maintained pressure at the fan outlet will this system deliver the required quantity of air?

2. What fan will deliver at its outlet the required quantity of air and maintain the required pressure with the minimum expenditure of power?

The experiments made have dealt mainly with the second problem. It was determined in the beginning to obtain results from the fans when working under conditions practically the same as when in service on board ship. This required that each fan should discharge against pressure into a pipe somewhere near the size of its outlet and that the pressure in the pipe and velocity of the air should be determined simultaneously with the actual power being delivered to the fan.

Mr. Taylor describes in detail the tests made upon selected fans operated by special electric motors through a spring torsion dynamometer, the air velocities and pressures being measured with a special form of Pitot tube. A number of such tests were made at the Model Basin at the Washington Navy Yard, and from the results thus obtained the corresponding characteristic curves for several fans were plotted. From the formulas deduced from the laws of similitude these results may be applied to similar fans of other dimensions and speeds. The value of these experiments, therefore, extends beyond their immediate application, and they form an acceptable contribution to an important department of applied science.

Among the experiments may be noted also those to determine the pressure required in a pipe to maintain a certain discharge. This involves the determination of the friction of air in plain cylindrical pipes. The method employed was that of measuring the velocity and pressure of air at two different points on the same pipe, the points being separated by a distance sufficiently great to enable reliable quantitative results to be secured.

The following conclusions were deduced from the experiments:

1. The co-efficient of friction does not change with the velocity of the air for velocities up to 6,000 feet per minute.

2. The co-efficient of friction does not change with the size of pipe, at least up to sizes three or four square feet in sectional area.

3. The friction varies at the squares of the velocity of air through the pipe.

4. The co-efficient of friction for pipes of the best workmanship in the best condition is as low as .00008.

The paper of Mr. Taylor forms a most useful contribution to this important department of work, and it will be found of service not only for marine work, but also in connection with stationary installations.

THE EFFECT OF SCALE IN BOILERS.*

Scale on the heating surface of boilers is usually regarded as a positive evil, and considerable money is expended in removing scale-making material from the water supply of railroads. In a recent paper by M. E. Wells attention is called to the benefits of a thin layer of scale in preventing corrosion. It has been known for some time that pure water containing carbonic acid causes iron or steel to corrode rapidly, and a small per cent of carbonate of lime has been added to boiler waters to prevent this action. If boilers were supplied with pure water they would pit and corrode much more rapidly than they do with ordinary lime waters. A small amount of scale on firebox and tubes must be regarded as desirable rather than otherwise when the life, only, of the boiler is considered.

The effect of scale as a nonconductor on the heating surface must be to interfere with the transmission of heat to the water, and its resistance is proportional to its thickness. The amount of this resistance is much less than is usually supposed, and the loss in efficiency of evaporation is probably only one-fourth of that which has been for years accepted as nearly correct. It has often been noted with surprise that the fuel consumption for equal work does not change rapidly as locomotive boilers become scaled, and that an ordinary coating ⅛ inch in thickness does not have any marked effect on the coal record.

The uncertainty connected with the problem is due to the fact that an important element in the calculation is the specific internal thermal resistance of boiler scale, and this has not been definitely determined, and this resistance is different in scales of various compositions. On locomotives which are constantly using a variety of waters the scale is very complex, but is often composed of layers of carbonate of lime and sulphate of lime, intermixed with earthy, nonscaling material deposited from ordinary muddy water. Locomotive tubes often show that a deposit of alkali has been enveloped by the hard coating of sulphate of lime, so that it cannot be washed off, and several layers of this mixture may be formed before the tubes are removed for cleaning. The thicker the layer of scale, the higher the temperature of the plate or tube, and this increase in temperature is one of the principal objections to scale in boilers, as it is a frequent cause of leaks and results in rapid deterioration. Water purification will therefore be found an economical measure, more on account of the reduction in expense for locomotive repairs than in the saving of fuel.

According to the modern theory of heat conduction, we can, for illustration, regard heat as being fluid in its nature, like water, and temperature as analogous to pressure. With water flowing through a tube the amount discharged is proportional to the difference in pressure at the two ends. So, also, the flow of heat through a steel plate or a layer of mineral scale is in proportion to the difference in the temperature of the two sides. Many attempts have been made to measure the temperature of the fire side of the boiler heating surface, but the difficulties are so great that there are little, if any, accurate data to which we can refer. The use of the thermo-electric pyrometer in connection with boiler experiments should give fairly accurate results, but the absence of correct figures for this part of the calculation is another reason to account for the hazy and totally erroneous ideas which prevail in regard to the loss in boiler economy due to the resistance of scale.

The expression for the flow of heat through a plate or layer of scale is analogous to Ohm's formula for the flow of electricity, and can be stated thus: $Q = \frac{t - t'}{rp}$, where Q is the number of heat units transmitted through the plate per square foot of surface per hour, t, the temperature of the plate on the fire side, t, the temperature on the water side, p, the thickness of the plate, and r, a constant for the specific internal resistance of the material. The value of r may be taken approximately, as .0043 for firebox plates and for carbonate of lime at .07. For the heat units transmitted when the heating surface is covered with a layer of scale, the formula becomes: $Q_1 = \frac{t - t'}{rp + R s}$ where R is the resistance of the scale and s its thickness, t, the temperature just within the water surface of scale. If exact values could be given for these coefficients of resistance and the temperature of the plate, it would be a simple matter to calculate the loss due to ¼ or ⅛-inch thickness of scale, but by assuming conditions which are extreme, we may obtain maximum results which show that the resistance of scale has been greatly exaggerated. To obtain a figure for the temperature of the plate on the fire side just within the surface, we can transpose the formula and find a value for t by the expression, $t = t' + Q\,r\,p$. To obtain a value for Q we can take the high figure of 40 pounds of water per square foot of heating surface per hour, which may be reached in the locomotive firebox, but seldom, if ever, in the tubes. The total heat units in one pound of steam at 100 pounds pressure is 1,185 and $Q = 1{,}185 \times 40 = 47{,}400$ heat units. $t' = 338°$ F., the temperature of water at 100 pounds pressure, $r = .0043$, the coefficient of resistance for the plate, and $p = .375$, its thickness. Then $t = 338 + (47{,}400 \times .0043 \times .375) = 414°$ F., and $414 - 338 = 76°$ F., the difference in temperature of the plate on the fire and the water sides necessary for the rate of evaporation, as given above. Using this value of t in the equation for a plate covered with scale, the number of heat units transmitted are obtained and the difference is the loss due to the resistance of scale. For the coefficients here taken it will be found that a layer of scale ¼ inch thick, composed largely of carbonate of lime, would not decrease the evaporating efficiency of a boiler as much as 5 per cent, while numerous catalogues and some text-books state that the loss due to ¼-inch scale amounts to 20 per cent of the fuel used and ¼-inch thickness causes a loss of 40 per cent.

While the method of calculating the loss as here given cannot be regarded as exact because the constants for heat conduction have not been accurately obtained, yet the results must be more reliable than the extravagant figures usually given for this loss.

*Reproduced from the Railway Age.

"If people traveled as fast on the railroad as they expect to travel in advertising, it would take about twenty minutes to cross the continent."—White's Sayings.

JOINTS OF DRAINS.

By James G. D. Armstrong.*

It has been patent to me for many years that cement joints in stoneware drain pipes fail to maintain their power of standing both or either the smoke and hydraulic tests, and this sometimes soon after the laying of the drains, and sometimes after a considerable lapse of time. As a rule, however, I find the failures can be traced to either the materials being at fault or the method of laying.

I have often found the flanges of pipes cracked after the water test has been applied, and even before filling in the trenches, and at other times months afterward when the pipes were "bared" for connections. These failures—notwithstanding the drains have been tested by water and found watertight at time of construction—are due to one or other of the following causes, viz.:

1. Swelling of the cement in the joint.
2. Uneven expansion of the concrete bed, especially if made of "hot" cement or ground or lias lime, and not of equal thickness as when deep holes are filled up in the bottom of trench or in large "hand-holes"—the expansion lifts the pipes off their bed.
3. Uneven settlement of the bed, causing deflection of the adjoining joints.
4. Uneven or careless filling-in of the trench or workmen walking on or knocking the pipes, or by debris falling, etc.
5. Testing or filling-in the trenches before the cement is thoroughly hard.
6. Contraction of the cement in the joints.
7. Failure of the joint to stand the pressure, excepting, of course, the jointing material.

Causes 1, 2 and 6 are due entirely to the quality of the materials at the time of using or to their wrong manipulation. A thoroughly practical and theoretical knowledge of Portland cement is absolutely necessary that no failure may arise from this material. In this short note a complete specification of this material cannot be given, but suffice it to say it should be tested for contraction, expansion, adhesion, disintegration (by boiling for twenty-four hours after parts have been made for twenty-four hours), specific gravity, which should be about 3.1—weight per bushel is an unreliable guide—also whether it contains free lime or free gypsum; then further for tensile strain, which should be not less than 500 pounds per square inch, at seven days, the briquettes being mixed up as stiff as possible are "thumbed" into the molds; and lastly, but perhaps the most important, its fineness, 80 per cent, of which shall pass through a sieve having 32,400 (thirty-two thousand four hundred) holes per square inch, and the whole through a sieve of 2,500 (two thousand five hundred) holes per square inch. If not very finely ground it may expand months after using, thereby cracking the flanges or loosening the key between the pipe and the cement.

Cause 2.—I do not agree with the use of hot lime being used for foundation owing to its expansion; so far as lime is concerned it should rank in the same category as clay joints. Cement only should be used.

Cause 4.—As to this, probably more failures in drains found by retesting arise from these faults than any other, and "carefulness" alone is the remedy, and the same applies to cause 5, both respecting filling and testing.

The thoughts—on reflection—of failures under 4 and 5 depict a gruesome picture in the fact of modern science, and the British workman, who is generally employed to put in drains. Trench excavated—much too narrow—pipes laid and jointed—men very careful—inspector tests by water—the inspector in a hurry—drains full, ten minutes—inspector says "fill in" and goes—the water let out—workman returns to fill in—treads on pipes—"onward march" his only thought—filling begins—"filling bumps" on pipes—ramming begins—shaken joints—trench filled, all perhaps, in twenty-four hours, especially if a quick-setting cement be used—a most dangerous and expanding material. Oh, that it were not true, and more so where drains are inspected and approved by inspectors to local authorities. Yet we have often to retest such work with only one result—failure to hold water.

Have any persons in this audience or has any other person ever heard of a local authority that has power, and that insists upon testing private builders' cement used for drains, or is there one authority that insists upon testing the drainage of a building by water after everything is completed, and all external forces and weights have found their permanent bearing? I know none, not even one, nor any statutory power.

Cause 7 applies in many cases—

(a) From improper form of joint.

(b) From the sockets and spigots of the pipes being so highly glazed as not to form a proper surface to allow the cement and pipe to thoroughly adhere to make a permanent water-tight joint.

The only cement joint I know that will stand satisfactorily the water-test is this, i. e., the cement should be keyed at both ends, the whole space in the joint being filled in with cement without gaskin or other material, and my personal experience also proves that no sand should be used. The most important point at which the joint should be perfect is between the end of the spigot and the bottom of the socket, a fact which is overlooked by many engineers who use or specify gaskin, etc. When the pipes are being glazed in the kilns they are stacked on end one on top of another, and where the socket and spigot touch the surfaces are unglazed, forming a natural key for the cement. If from careless stacking the ends are glazed they should be chipped.

Joints made with gaskin should be strongly opposed: (1) Because they disallow the most important part of the joint; (2) because they allow of a large amount of play in the line of pipes, allowing the pipes to "sag," thus breaking the seal between the glaze and the joint; (3) because they allow of inferior workmen making the joints; (4) because they will not stand any pressure, especially if subject to vibration.

Joints made with cement should be absolutely free and rigid, and drains with cement joints should be laid on a foundation which has no possibility of yielding or uneven settlement if it is intended they should remain watertight. If concrete be used it should be very fine, no part to exceed a ¾-inch ring gauged about 6 to 1 of Portland cement (or stronger, according to soil), and should contain sufficient sand to cause it to consolidate in a solid mass around the pipes—in fact, to form a concrete pipe outside the stoneware pipe.

When recently removing some old drains where gaskin had been used and then the joints "collared" with cement, I found the collars in some places loose, and in others a little pressure enabled me to withdraw the spigots from the sockets. I have also found the same result where the part of the joint between end of spigot and socket has not been full but no gaskin used. It is not to be wondered at when the only seal is between the glaze and the cement.

When the cement used has been of the proper quality, I have no hesitation in saying that very many of the

*Read before recent British Congress on Sanitation

"failures" found upon retesting arise from the breaking the seal or cohesion between this glazed surface and the cement, and this may arise from many causes tending to alter the position of the pipes after first making the joint, either before the cement is permanently hard or at any future time, or from the contraction of the cement. It is most imperative that no cement be used for drains which shows any signs of contraction, and that as little water as possible be used in its manipulation. These facts are proved by careful observation, which shows that the water oozes out between the cement and the pipe.

Some authorities assert that expansion and contraction in the length of drain causes failure, but I have no personal knowledge of such a result and cannot in any way conceive how the temperature in a sewer can so affect stoneware and cement. Perhaps this idea has been conceived along with the invention of elastic joints, such as mastic, but I cannot accept the theory without proof, which at present I cannot find. With a long, long stretch of imagination, I might figure some would-be sanitarian putting expansion joints on a 4-inch cast iron drain a mile long.

To avoid several of these failures many patent joints have been produced, the chief principle in which is having some jointing material of an elastic nature, such as pitch compositions. Some are very satisfactory if used in connection with cement. There is no gainsaying they are "avoidances," not "remedies." The following suggestions may prove useful to those who try to make them perfect without resort to patent joints or patent pipes.

1. By having a perfectly rigid foundation or bed. The only way to obtain this is by leveling up on rock with suitable cement concrete, or in other soils by sufficiently thick bed of Portland cement concrete, which should be thoroughly hard and set before laying the pipes.

2. By carefully testing the cement to find its qualities, and selecting suitable material.

KINKS AND WRINKLES

By the Artful Dodger.

It has been found by experiment among French physicians that covering a wound with the membrane from a raw egg facilitates the process of healing and lessens the scar which remains.

Wooden stave pipe, made of pine or redwood staves and bound together by steel bands, is said to be finding a growing use for water conduits, being much cheaper than cast iron or steel riveted pipe for use in the larger size.

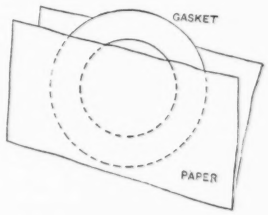
A splinter may be extracted painlessly by filling a large-necked bottle nearly full of air and pressing the flesh firmly over the mouth of the bottle, when the action of the steam will draw out the splinter and with it all inflammation.

Black oxide of manganese mixed with sufficient raw linseed oil to bring it to a thick paste, is recommended by a correspondent of Machinery as a cement for steam and water joints. Remove pressure from the pipe and keep sufficiently warm to absorb the oil while the cement is being applied to the joint or leak. This cement will be as hard as the iron pipe in 24 hours.

If an article which is made of wrought iron is heated in contact with substances rich in carbon, such as bone dust, horn shavings, or yellow prussiate of potash, the iron at the surface will be converted into steel, which is hardened by quenching in water. This process is very often applied to the wrought iron working parts of machines after the parts are machined and finished.

Air leakage through boiler settings of brick can be lessened by giving the walls two coats of Portland cement wash and then one coat of cold-water paint to brighten them up, according to Mr. William C. McCracken, in a recent paper on boilers and furnaces before the Ohio Society of Mechanical, Electrical and Steam Engineers.

There are a few simple kinks which, if observed in cutting and applying gaskets, will make the work much easier, says a correspondent of Machinery. While cutting the rubber, have a dish of water at hand and keep wetting the cutter. Excellent results may be obtained by this method on rubber gaskets 1 inch thick. A gasket



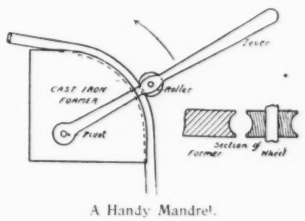
Method of Inserting Gasket.

will be much more easily removed should the joint break, if the flanges are chalked at the time the gasket is put in place.

Where two flanges cannot be separated any great distance and there is trouble in inserting the gasket, place it between a folded sheet of paper as shown in the sketch, and it will go in more easily. After some of the bolts have been entered, tear out the paper.

It is a good thing to put in the supply line for a gasoline engine near the tank a valve which has in it a wire gauze, which will strain the gasoline as it goes toward the engine, preventing any chips, dirt or sediment from reaching the engine and causing trouble perhaps by preventing the valves from seating, says the Engineer. It is surprising what a quantity of dirt and chips from barrels will sometimes get into the gasoline, and many an operator has spent hours trying to find out what was the matter with his engine, eventually to learn that it was from dirt in the gasoline which had prevented the check valves from seating, or some other like trouble.

A handy mandrel or former for bending iron piping while hot is shown in the accompanying illustration. A lever and roller is used to press it into shape. Copper



A Handy Mandrel.

piping may be bent while cold in the same way, but should first be filled with molten lead to prevent buckling, says the Model Engineer. Remove the lead by heating the pipe.

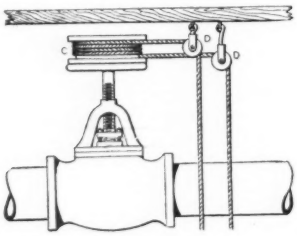
A novel method of preventing rust was described in a paper read by Louis H. Barker before the June convention of the American Society for Testing Materials. It consists in sticking paraffin paper to the steel work and three years of experimenting under most trying conditions have demonstrated its superiority over any known

protective method. All paint is porous and rusting begins between the paint and the metal long before the paint itself is weathered through. The mode of application of the paper is as follows: After the rust is carefully cleaned off by means of stiff wire brushes a certain kind of tacky paint is applied, the paper then covered over and tightly pressed upon the painted surface, the joints of the paper slightly lapping. As soon as the paper is in place it is ready for the outside coat of paint. It will be observed that by this process the first coat of paint, the paper and the coat of paint over the paper can be applied with one scaffolding, thereby greatly reducing the cost, especially in high and dangerous places.

Almost all hack saws or jig saws will cut soft brass very well. The teeth must be very fine and some judgment employed in their use. The jig saws are extremely light, not larger than a small wire, and must be used in a spring frame that will hold them tight so that they will not double up. Jewelers' saws will be needed for spring brass.

A valve that has to be opened several times every day was very difficult to get at, being in the position shown in the sketch. A correspondent of the Engineers' Review tells how he rigged up a device by which the valve could be opened or closed without climbing up to it on a ladder.

A wooden wheel, flanged, was turned and bolted to the valve wheel, as at C, with ¼-inch bolts, having the heads



Valve Opening Device.

cut off and bent in the shape of a hook, in order to lap around the arms of the valve wheel. A length of ⅜-inch rope was wound around the wooden wheel, giving it enough turns to open or close the valve without having the rope bring upon the part of the valve to which the pulley was fastened. Small pulleys, D, D, were suspended from the beam by screws, and the rope passed over these, as shown, to bring it down within easy reach and prevent its running off the pulley. An endless rope was used and by pulling one way or another on it the valve can be opened or closed as desired.

A good cement for making tight pipe joints can be made of a mixture of 15 parts of slaked lime, 30 of graphite, and 40 of barium sulphate. The ingredients are powdered, well mixed together, and stirred up with 15 parts of boiled oil. A stiffer preparation can be made by increasing the proportions of graphite and barium sulphate to 30 and 40 parts respectively, and omitting the lime.

The problem of keeping machinery in a nice, bright condition is often a cause of much annoyance, especially in places of close proximity to salt water. A very good anti-rust compound that has been used quite extensively of late is made as follows: Dissolve one ounce of camphor in one pound of melted lard; take off the scum, and mix in as much fine blacklead as will give it color. Clean the machinery and smear it with the mixture.

To give tools a blued steel finish they should be first cleaned free from grease, oil or varnish. Dissolve 4½ oz. hyposulphite of soda in 1 qt. water and make another solution by dissolving ¼ oz. acetate of lead in 1 qt. water. Mix the two solutions and heat to the boiling point in a porcelain dish or stone pot. Warm the cleaned tool and, using a piece of sponge tied to a stick, smear it with the hot solution. When the color has developed, the steel should be washed, wiped dry and finished with boiled linseed oil.

In mixing cement for concrete work care should be taken to secure for the work the cleanest and sharpest sand obtainable. Sand mixed loam makes a comparatively weak cement, while if the sand crystals have lost their sharpness through being water worn the concrete will have less strength. A proportion of half sand and half Portland cement will give the best results for cistern work, but the facing should be somewhat stronger in cement. These materials should be first mixed dry and only as much water should then be added as will moisten them thoroughly. A surplus of water must necessarily evaporate and will weaken the concrete in so doing. Concrete should be used as soon as possible after mixing to avoid partial setting.

Trouble with an air-bound pipe line is described by a writer in Power as follows: "Some time ago I laid a line of 4-inch pipe about 3,000 feet long. The first 1,000 feet gave me a fall of 530 feet; the rest of it was comparatively level. As the pressure was not required and some of the pipe not very good, I did not put in any valve, but piped direct to a tank having a large enough overflow to take care of any excess in case of the mill shutting down. When everything was completed, the water was turned in, and after waiting some time we were somewhat surprised that no water came to the mill. I had had a similar experience before, but never when there had been so much pressure, and was inclined to think something had gotten into the pipe. However, I took a sharp pick and hunted the high places. When I found one very prominent, I stuck the pick into it. After finding about a dozen of them, the water came all right. I have since lowered the high places when possible, and put in petcocks where I could not level the pipe, and have had no more trouble."

Electric purification of drinking water will probably soon be introduced into the home. This method, already used by a number of municipal waterworks, especially in Germany, is based upon the germ-killing effets of ozone, which is cheaply engendered by electricity. If an electric discharge takes place between two glass tubes, one inside the other, whose surfaces facing each other are coated with metal, ozone is developed in the space between the tubes. Electricians have tried in recent years to simplify the means of electric ozone development for purifying water. The ideal apparatus would be one which every housekeeper could put up in the kitchen, and by utilizing the electric current of the common electric-light wires purify every glass of drinking water. According to the Frankfurter Umshau, such an apparatus seems to have been successfully made by a French engineer, Mr. Otto. This apparatus is of very simple construction and takes up little space. It consists principally of a small, closed box, the metal cover of which is made conductory with the bottom. In the box is an ozone developer, an interrupter, and a tin tube. Through the latter the ozone, which first has to pass through a cotton stopper to free it from dust and germs contained in the air, is conducted into the water and mixed therewith. If much ozone has been absorbed, the water becomes phosphorescent in the dark.

SOME NOTES ON AUTOMATIC SPRINKLER SERVICE.

An automatic sprinkler equipment consists of an arrangement of pipes regularly spaced under all ceilings and extending to all closets, rooms, under benches and all concealed spaces with automatic sprinkler heads or valves attached; the system of piping being supplied automatically with water from elevated tanks, pressure tanks, city connections or pumps. Two of any of the above sources of supplies being necessary for standard equipments, and in cities having fire departments, steamer connections are attached to the equipment in such manner that the fire department may pump directly into the system, reinforcing the supplies. There are two kinds of equipments, wet pipe systems in which the pipes are continuously filled with water, and dry pipe systems, the pipes of which are filled with air as far as the automatic valve which is held closed by the pressure of the air. In buildings where the temperature is such that the water in the pipes would be apt to freeze, dry systems are installed; wet systems are preferable, says the Canadian Manufacturer, as their operation is more prompt, and there is less opportunity for this class of equipment to become disarranged, as there is no obstruction to the flow of water when the main valve is open but the sprinkler heads. The sprinkler heads, or valves, are sealed with fusible solder melting at temperatures ranging from 165 to 360 degrees, determined by the temperature of the place in which the sprinkler is to be located. It was shown that in joist construction the space between the joists is to some extent out of reach of the distribution from the sprinkler heads, and fire obtaining headway in these spaces must be extinguished by hand. Under open joisted construction the pipes should be run at right angle to joists, not more than 10 feet apart, and sprinkler heads placed not to exceed eight feet apart on pipes and the sprinkler head staggered—that is, the sprinkler heads to be so located as to distribute water into alternate joist channel ways.

Two sources of supply are necessary to lessen the chances of a water shortage in time of fire; one of the supplies should furnish water under a heavy pressure, that the first sprinklers opened may be as effective as possible. Public water works, having adequate sized mains and providing a continuous heavy pressure, are most desirable; next in value are pressure tanks, which furnish an excellent primary supply, especially in connection with wet pipe sprinkler service; pressure tanks are not so effective for dry pipe sprinkler service, as much of the initial discharge is consumed in filling of the empty pipes; the tanks should not be placed below the top floor, and better service is obtained if located upon the roof, as less air pressure would be necessary to expel all of the water under good pressure, the tank being above all of the sprinkler heads. Pressure tanks are cylindrical in shape, constructed of steel, air tight, and the size of the tank generally used is 66 inches in diameter and 25 inches in length; total capacity 4,500 gallons; water capacity 3,000 gallons; two-thirds of the tank containing water and the remainder filled with air under pressure. The number of tanks necessary depends upon the number of sprinkler heads per floor, and if the tank supply is of a capacity to supply 20 per cent of the sprinkler heads upon the floor having the greatest number, allowing 200 gallons of water per head, the supply will be considered sufficient. No tank, however, should be of less than 4,500 gallons capacity.

Greater quantities of water may be stored in gravity tanks, as no air space is required. The tanks should be of a capacity sufficient to provide 5,000 gallons for each 100 sprinkler heads upon the floor having the greatest number. The pressure of the water delivered from gravity tanks is wholly dependent upon the height of the tank above the highest sprinkler heads, and the tank should be elevated as high as possible.

A NEW SYSTEM OF CONTRACTING.

The various methods of paying for construction have been the subject of much discussion for many years, but the latest of these to occupy a prominent place, the system of paying the **actual cost plus a fixed sum** to the contractor, is comparatively novel. It was taken up by Mr. Frank B. Gilbreth of New York and Boston a few years ago. In 1902 a little over half his business was done in this way, while today all of it is on this basis. In view of the diversified character of the many large works undertaken by this builder, such as dams, power stations, shops and even complete villages, the increase in favor of the system of payment on a cost-plus-fixed-sum estimate deserved consideration.

The early system of contracting, under which the larger part of the construction undertaken today is carried on, was based on a lump-sum bid. In simple work of well-known character, where great speed is not required, this is probably the most satisfactory method to adopt. But as the difficulties increase the system gradually develops marked defects. Bidders cannot foresee all troubles that may arise, and they either largely increase their bids to cover these probable but unknown contingencies or else take the risk of being overwhelmed with financial disaster. Either the owner or the contractor must lose considerable money when difficult construction is undertaken on the lump-sum basis.

The second system of payment was devised to meet defects of the first method. It is the plan of paying the contractor for his services a percentage of the actual cost of construction, as shown by the books kept for the work. This frees the contractor from any bias toward skimping materials and workmanship. Where owner and contractor have confidence in each other the system is a good one, but sometimes, when the construction has proved unusually difficult and tedious, the heavy cost has caused bitter controversy between the two parties. The owner has claimed that the contractor made the work unusually expensive in order to increase his fees, while the contractor has claimed that the owner demanded impossible things.

Under the cost-plus-fixed-sum plan the owner knows from the outset just what profit the contractor will make. It is not altered by deviations from the estimates of the cost, and the contractor has no incentive to produce anything but the best work. The owner can purchase the materials himself or allow the contractor to do so, the latter usually being the better plan. Changes can be made in the plans without any objection by the contractor. When time is precious the foundations can be started before the details of the superstructure are completed. In short, the whole arrangement makes the contractor a sort of professional man, retained at a definite fee for a definite purpose. Such a system on large undertakings manifestly has much to commend it, says the Engineering Record, in commenting editorially upon the system. Its merit as a preventative of controversy deserves recognition.

Smoke has been turned to good account in Brussels, Malines and other Belgian towns. It is driven by a ventiating fan into a filter filled with porous material, over which a continuous stream of petroleum, benzine or alcohol flows. By this means the smoke is suppressed, while the filter yields a gas of great heating power.

LETTERS TO THE EDITOR

Reciprocity on a Broad Scale.

Editor of Domestic Engineering.—Dear Sir: As a manufacturer of standard, high grade goods, now extensively used by the plumbing trade in the United States and Canada, I wish to say a few words about trade conditions. I am assured of the fact that my experience will not fit all cases and may possibly jar some who naturally think otherwise.

At the present time there is considerable talk about reciprocity between the manufacturer and jobber for the best interests of the entire trade. I am heartily in favor of reciprocal relations which would be of permanent benefit to both interests and at the same time establish an elevating tendency on all the potent factors that go to make up this most important industry.

However, I am not so narrow minded (and I am pained to see that there are some in the trade who can only see one side of this question) as to imagine that any one sided reciprocal deal will be of lasting benefit to anybody. The time has come when we should throw to the winds our pessimistic views and enter on a broader plane of action.

There is no use of attempting to enter into reciprocal relation unless the full meaning of that word is comprehended by those essaying the task. A partial bargain will not hold water or pay for the exertion of bringing it about. The question of what is best for the interests of the trade is a broad one, fraught with many pitfalls and must be circumvented with an eye single to the future benefits to be derived for the entire trade as a body; not for any individual or class of individuals.

I am aware of the fact that we have among us many manufacturers who will be unable to comprehend such a policy, and there are also undoubtedly many jobbers in the same boat who cannot see past the end of their noses. Their attitudes are only human and should be neglected by the strong, constructive minds who are able to plan for the welfare of all.

There are certain elementary and economic factors that present themselves in connection with this problem and revolve around the main point.

It is up to the better element of manufacturers and the better element among jobbers to get together on a sound economic basis and stand shoulder to shoulder at the wheel of fortune. If we are to do business through the jobbers of this country we should see that their preferential is strong enough to hold them, allow them a fair margin and save ourselves from becoming their bankers. If we shall appear niggardly and drive them down to a basis where they cannot do business with a fair profit, we either force them for self-preservation to become partially or wholly manufacturers to our detriment, or reduce them to a condition where it is a case of the survival of the fittest, in which case the manufacturer foots the bills of all those who succumb to the financial strain.

We should obviate the necessity of being forced to endure the stench that arises from such fiascos as the E. S. Wheeler episode and other failures that will surely result from the policy of jobbers who are willing to accept and push on the market goods, the profits from which will not pay the expenses of handling.

I am gratified with the stand now being taken by many of our leading jobbers who are working assiduously to rid their market of worthless trash. They should receive ample encouragement from every manufacturer of standard goods when quality predominates in this country. This is a move in the right direction. It will have a tendency to bottle up the jobber whose sole aim is to "beat the price." The sooner the manufacturer of high grade goods comes to the conclusion that he has not got to "beat the price," i. e., hawk his goods about to jobbers who throw in his face the prices of the cheapest material on the market and try to drive his prices down by these tactics, the better it will be for those who are trying to live and let live.

It is better for the manufacturer, the jobber, the plumber, and last, but not least, the man that buys the house or building, that goods be installed which will give satisfaction.

The plumber that puts in first-class goods knows that they will please, while the one that puts in shoddy material is always expecting a kick from his customer. If the plumbing fraternity of this country would expose to intending purchasers of buildings "built to sell" the rotten plumbing in each instance, contractors would soon find out they would have to put in goods that would stand the wear or stop building with the intention of selling. This would eliminate a large amount of cut-rate competition and reflect through the jobber back to the manufacturer of good material. If the best jobbers throughout the country will exert themselves to stamp out the cut-rate business, which has its foundation in goods "made to sell," they will aid in maintaining a standard in the plumbing line which at the present time is so essential and which every honest manufacturer should appreciate and co-operate to maintain.

It is very gratifying to see the work being done by the Pittsburg jobbers in stamping out material of dubious origin. This kind of energy and foresight should be commended by every manufacturer of standard goods of quality in this country. What is being accomplished in the Smoky City can be brought about by sagacious jobbers in other sections of the country.

The manufacturers can aid in elevating the standard of plumbing goods by putting A1 men on the road and eliminate the cheap salesman who is afraid to say his soul is his own when in the presence of a cut-rate jobber. One good salesman is worth six ordinary men; will sell more goods; will leave a better impression; will maintain prices, and, in fact, will give more universal satisfaction than a score of imitations.

It is a fact, although possibly not realized by many manufacturers, that cheap salesmen are largely responsible for the cut-rate situation. The manufacturer has been blinded to the situation by this class of men who have harped at him to make cheaper goods. The cheaper the salesman and the less able he is to cope with the situation, the more he will want to sell the goods that are below others in price. Anybody can sell goods if the price is low enough, and the poor salesman knows that he has got to handle goods with the "price right" for him to make a showing. The manufacturer that hears a salesman continually shouting price—which is the ear-mark of an imitation salesman—may as well make up his mind that he has a pretty poor stick to represent his business.

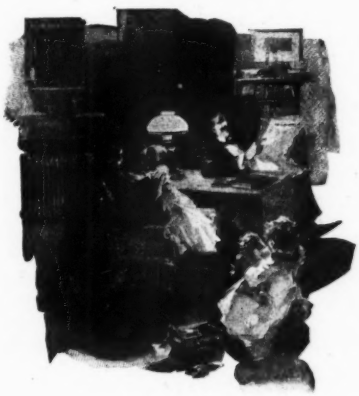
MANUFACTURER.

The humble beginning of our postal system in 1789 was superintended by Samuel Osgood. He found one clerk more than sufficient and was obliged to see him loaf, there being only seventy-five postoffices in the United States. It is now the largest business in the world and has the greatest number of employes. If they were "called out" one can't help but imagine the conditions that would come upon the whole civilized world.

Peace.

Peace is the evidence of correct judgment—peace among the nations, among their peoples,—in their homes and abodes.

May the olive branch rest on the conference at Portsmouth Navy Yard.



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St. Louis, 207-209 N. Tenth St.
Minneapolis, 204-206 Fourth St., So
Omaha, 413-417 S. Tenth Street.
Denver, 831 Fifteenth Street.
Seattle, 1215-1216 Alaska Building.

WHOLESALE PLUMBING

Robert Kohler, president of the J. M. Kohler Sons Company, of Sheboygan, Wis., died at his home in that city on Friday, August 4, from rheumatism of the heart. He was born in 1869 and consequently only 36 years old.

The Moseley & Pritchard Manufacturing Co., of Clinton, Iowa, has purchased the business of the Moseley Folding Bath Tub Co., of Chicago, and will hereafter manufacture this company's line of goods at 420 North Second street, Clinton, Iowa.

Thomas Kelly, of Thomas Kelly & Bros., Chicago, is enjoying the salt breezes of the old Atlantic on the broad piazzas of the Hotel Rudolph, Atlantic City. He has recently wound up a strenuous tour of the South and feels the need of rest and recreation.

Ellis Engineering Co., of New York, has been incorporated with a capital of $100,000 to manufacture devices for elevating sewage and other liquids. The incorporators are: George V. Ellis and William M. Mercer, both of New York; George W. Kelley, of Poughkeepsie, N. Y.

The Executive Committee of the Confederated Supply Associations will meet in Detroit August 22. In the office of Secretary Woodward, in New York, it was authoritatively stated that contrary to a report circulated there will be no general meeting of the associations until a later date and that this will be a committee meeting only.

The National Lead Company has filed a certificate with the secretary of the state of New Jersey increasing its capital stock from $30,000,000 to $50,000,000. The stock is divided into $25,000,000 preferred, bearing 7 per cent cumulative dividends, and $25,000,000 common. Lucius A. Cole of East Orange, N. J., is president of the company, and Charles Davison of New York is secretary.

The Basis for Credit.

A correct and safe basis for credit includes three great essentials; namely, Capital, Character and Ability.

According to Bradstreet's summary for 1904, there were 10,417 failures in the United States, of which 7,370 or almost 75 per cent of the whole, are directly attributable to lack of these cardinal qualifications.

In considering the basis of credit, we put capital first, not because we think it of more importance than character, but because that seems to be its natural place.

Capital is the accumulated product of industry and labor. It is the crown or surplus of a man's income, **his accrued energy,** that which he has by him or, as we often put it, that which he has "to the good."

Capital is essential in the basis for credit—

First, because it is a guarantee of security to the creditor and of good faith on the part of the debtor. If the debtor is risking his own capital he will naturally guard his investments more carefully, and the creditor's risk is thus proportionately lessened.

Second, because most kinds of merchandise, and especially general stocks, cannot be turned rapidly enough to pay for themselves within the usual or discount period.

And since for various reasons it is desirable, both for debtor and creditor, that discounts should be taken, the merchant must have sufficient capital of his own to relieve or take the place of the capital in the shape of goods, which has ben loaned to him—when the same becomes due; in other words, he must have capital that he may pay promptly.

In the list of failures referred to, lack of capital is assigned as the cause of 3,358 failures, or almost one-third of the whole number, telling better than any words of mine the importance of capital in the basis for credit.

Of course, credit should be in proportion to the capital employed. It would be difficult if not impossible to suggest any rule that would apply in all cases, but I like to see a statement in which the entire amount of credit required or the total existing indebtedness does not exceed the amount of the active capital.

If capital be wisely used, credit based upon the same in such relative proportion will generally be safe.

But if carelessly managed or if credit limits be too greatly strained, that is, by increasing credit to an amount out of proportion to the basic capital, the success of the enterprise is rendered doubtful, for its affairs are thus placed in a condition in which they are no longer in the control of the debtor.

Will an honest merchant strain his credit to this point?

Certainly, an honest, thoughtful and wise man **will not,** and so in addition to capital a second factor is necessary in the basis for credit, namely, Character.

In the report already referred to lack of character is responsible for 1,070 failures, over one-tenth of all, including losses by fraud, speculation and extravagance.

Character is made up of those heaven-born qualities of truth, justice and faithfulness. The man whose thoughts and actions are dominated by these qualities has the character that will insure honest, wise and thoughtful management of his business.

Such a man will recognize that justice to his creditors (as well as to himself) forbids straining his credit to the outside limit, or beyond it, as is so frequently done. Justice in his character will cause him to protect his creditors as well as himself by adequate insurance. His characteristic truth will not color too highly his assets nor put his liabilities at too low an estimate, neither will he conceal nor neglect to make known his true condition to those who have a right to know.

The man with such a character will have so high a regard for his word that he will be careful not to contract beyond his ability to perform. His faithfulness to his promises for payment will be held as a matter of highest honor. A man with such a character will be the honest man, **not** of that doubtful quality which is known as "law honest," honest only through fear of penalty. Neither will he be honest because "honesty is the best policy," but the man with a character, such as I have portrayed, will be honest because it is **right.** Such is the second great essential in the correct basis for credit. Bind together these two, Capital and Character, with the golden link of ability, and we have a combination unexcelled.

Bradstreet's summary gives 2,942 failures as the result of incompetence and inexperience which we might classify as lack of our third great essential—Ability. It would be superfluous for me to remind you of the importance of this factor. These figures speak for themselves.

Ability is that mysterious quality which **recognizes the fitness of things,** that which does **the right thing at the right time and in the right place.**

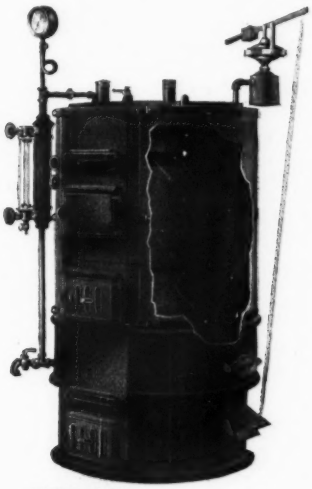
Ability is the vital spark that puts energy behind capital and character and links them to success.

A merchant with capital and character but without ability is like a sailing vessel, staunch of timber and surely guided, but which lacking motive power within itself is therefore dependent on favorable winds and currents for progress. While there may not be shipwreck, those who wait for the cargo may grow weary.

So Capital and Character, lacking ability, while it may not mean failure, cannot promise great success.

"K-M-C" BOILERS AND RADIATORS

FOR STEAM AND HOT WATER HEATING



"K-M-C" SOLEIL BOILER.

Noteworthy Features in "K-M-C" Boilers

Direct and Indirect Draft Dampers—perfectly adjusted and accurately designed for easy control of the fire.

Draft Door and Chain Placed at Side out of the way so that they do not interfere with opening of front doors.

Ash Pit of Large ash capacity and provided with **Clinker Door** through which all parts of grate can be reached.

Clean Out Doors in Front—all interior surfaces easily reached.

Asbestos Lined Iron Jacket causes recirculation of heat and flames around the entire boiler before delivering smoke to pipe.

Latest Pattern steam **Trimmings** and **Tools** furnished.

The use of **"K-M-C" Boilers** will make friends for you, bring an early settlement of your bill for installing and gain more repeat orders than **will any other make.**

Send for complete and valuable catalogues.

Kellogg-Mackay-Cameron Co.

BOILERS, RADIATORS
HEATING AND PLUMBING SUPPLIES

CHICAGO

MINNEAPOLIS SEATTLE KANSAS CITY

MENTION DOMESTIC ENGINEERING

The man with capital and ability, **without character,** is like the ship with powerful engines but misguided course, which like the smuggler seeks to avoid the claims of justice.

This is a dangerous combination, for the creditor; its motto is, Succeed—honestly if you can—but, succeed.

If the man has character and ability **without capital,** we may liken him to a ship which with abundant motive power and true helm steers straight for its desired haven, but which, nevertheless, is of too frail build to outride the storm.

Under favorable conditions such a combination may succeed, but it is a doubtful proposition, and one which, if considered by the credit man, should be approached with extreme caution.

Continuing the illustration, a union of these qualities would be represented by the majestic ocean liner, which with steel frame and powerful engines, laughs at wind and storm, and, obedient to the true helm, sweeps proudly to her destination.

So any two of these qualifications are insufficient without the third, but combined they form a triple alliance, a trinity of excellence which the credit man will recognize as the true, the only perfect, the ideal basis for credit.—William A. Given, in Address Before Convention of the National Association of Credit Men.

Want the last word on the science of advertising? See announcement (page 57) of Elmer Crawford's remarkable discourse on the subject "How to Advertise; Where to Advertise."

WHOLESALE HEATING

The Holland Radiator Company, of Bremen, Ind., will build a new foundry addition 90x150 ft. in dimensions.

The Peters-Eichler Heating Company, of St. Louis, Mo., has been incorporated with a capital of $10,000. The incorporators are: Thomas K. Peters, A. Eichler and John S. Leahy.

Kinnear Pressed Radiator Co., of Pittsburg, Pa., has opened a branch office in the First National Bank building, Chicago, for the sale and exhibition of its products. J. F. Seegel is in charge of the office.

The D. T. Williams Valve Co., of Cincinnati, O., has purchased the patents, patterns and good will of Thomas J. Cookson, and the exclusive right to manufacture the steam trap and steam specialties bearing his name.

The National Tube Co. has placed a large and important order, for immediate execution, with the American Blower Co. of Detroit. The contract embraces complete heating equipment for their five new Butt Weld Mills at Lorain, O.

The W. N. Best American Calorific Company, of Setauket, N. Y., has been incorporated with a capital of $50,000 to manufacture hydro-carbon burners, etc. The directors are: W. O. Forman, W. H. Childs and Eversley Childs, of New York.

J. R. McColl, who was until the close of the last college term associate professor of steam engineering at Purdue University, although a man of high standing in his profession, has decided to take up commercial lines and has accepted a responsible position in the engineering department of the American Blower Co. at Detroit.

The petition in bankruptcy filed against William C. Root and George H. Droege, in business as the Century Manufacturing Company, manufacturers of gas stoves at 439 Canal street, New York, on May 27, has been dismissed by Judge Adams, of the United States District Court, by consent of the creditors. Arthur Rothschild, their attorney, said that they had made a settlement with their creditors at 50 cents on the dollar, payable 30 cents in cash and 20 cents in notes.

The Novelty Iron Works, of Canton, Ohio, manufacturers of steam and hot water boilers and radiators, are about ready to take possession of their large warehouse which has a floor space of 45,000 feet. This will be one of the finest warehouses in the country and faces the Pennsylvania railroad with a frontage on that road of 660 feet and 400 feet on the B. & O. R. R. It is a three-story structure of brick and connects with new sheds for the storage of coke, etc., extending along the railroad track 250 feet. These extensive buildings look as if the business warranted more ample facilities.

Want the last word on the science of advertising? See announcement (page 57) of Elmer Crawford's remarkable discourse on the subject "How to Advertise; Where to Advertise."

STEAM and MILL SUPPLIES

The Girard Boiler Company, of New York, has been incorporated with a capital of $100,000. The directors are: A. O. Girard, R. B. Wilhelm and H. F. Slueler, of Brooklyn.

The Fuel Saving Machinery Company, of Chicago, has been incorporated with $15,000 capital stock. The incorporators are: Clarence B. Fisher, F. V. Ohl and Percival Steele.

The New Bedford Gas Engine Company, of New Bedford, Mass., has been incorporated with a capital stock of $20,000. The company will manufacture gasoline engines at present, although gas engines will be built later on.

Chase & Matthewson Co., of Buffalo, N. Y., has been incorporated with a capital of $50,000 to manufacture belts and belting. The incorporators are: John L. Chase, Rufus Matthewson, Robert S. Cox and William R. Smith, all of Buffalo, N. Y.

Ross Stoker Co., of Hempstead, N. Y., has been incorporated with a capital of $60,000 to manufacture and sell all kinds of machinery. The incorporators are: John E. Dackendorff, 204 W. 86th street, and Allan A. Swingley, Cadillac Hotel, both of New York City; William A. Ross, of Rockville Center, L. I.

STRICTLY WROUGHT IRON PIPE is our specialty. We handle tubular goods of every description,—welded, cast and drawn,—iron, steel, brass and copper. Ship anywhere. Get our prices.
THOMAS F. CUSHING CO., Flatiron Bldg., New York

IT IS SO EASY

TO SELL

Victoria Acetylene Generators

THE ONE WITHOUT VALVES

BECAUSE

It is so simple any one can operate it.
It is so evident that it cannot get out of order or do any damage.
It is economical for it uses 2 x 3½ Lump Carbide which gives 20 per cent more gas than granulated.
It is an application of natural laws, they never fail.

No Handholes,
Rubber Gaskets,
Springs, Cogs,
Cams, Ratchets or
Stuffing Boxes.

We guarantee it to be the safest, most reliable and satisfactory on the market.

Write for catalogue and prices addressing Dept. E.

John Simmons Company

96-110 Centre Street, New York City.

The Standard Metalwork Company has been established by the G. H. Bushnell Press Company, Thompsonville, Conn., for the purpose of conducting the manufacture of large pipe bends with improved joints for high pressure steam service and difficult metal work generally, including steam superheaters, condensers and feed water heaters. James A. Colvin is president; Mark Worth Bushnell, business director, and James Acton Miller, mechanical engineer and director, the latter having been engaged a number of years in this class of special work.

Establishing a Foreign Trade.

The American concern contemplating the opening of foreign trade should send some responsible representative abroad to look over the ground; if he be one of the principals, so much the better. Second-hand reports in a case of this kind cannot be made forceful or give a comprehensive description of the situation adequate for mapping out a campaign. This representative should study the situation sufficiently to be able to judge of the possible markets, of the classes to which his products will go, in what centers its sale will be concentrated, how extensive it will become, and through whom the exigencies of the case will require him to sell. Understanding the situation, he can make intelligent plans to meet it. His first temptation will be to establish at once a foreign agency with a foreign firm.

There are three reasons which should absolutely forbid this. In the first place it is difficult to make a selection. He will probably receive many applications on handsome letter-heads, praying for the privilege of acting as his representative. These are usually worthless, and, more than worthless, even dishonest at times; they often come from houses whose object is to obtain goods and money under false pretenses. In the second place, he will find it hard to get able as well as honest men to act as agents. His goods are not known, their value has not been tried, there is no demand for them. Naturally such an agency is not an inviting proposition to the stable business man. Thus, in all probability the exporter will either get a poor agent or he will get poor terms. Either is singularly fatal, for in Europe a change in agencies is not such an easy kaleidoscopic operation as in this country. Agencies are serious, permanent things. In the third place, if an agency is established before any trade is built up, the agent will rarely go out after business; that is not the accepted European style of doing business. In other words, he cannot be relied upon to build a trade.

The last two reasons are strengthened by the fact that Europeans are brought up with the "exclusive agent" idea. There the manufacturer does not sell his line to other dealers in his city or territory. The jobber always wants the exclusive selling rights; and the bigger the territory, the better he likes it and the prouder he is. The words "Exclusive Dealer For" in his advertisements and on his letter-heads seem to tickle his fancy and to flatter his business pride. The real reason for this custom probably is that it lessens competition, for the result of it is that only one man in a town or territory can be secured to carry goods. Usually long-time contracts must be made with him, and then if he does not push the goods the exporter has no recourse.

The best plan is for an exporting firm to send one or two of its best agents into the foreign territory to work directly upon the consumer. It is not good policy to use foreigners for this work; they know the language and local customs, but they will have the same faults as the dealers: conservatism, prejudice, slowness. To make a fair trial requires a good hustling American salesman. And the characteristics of the typical American solicitor will guarantee him to be sufficiently adaptable to grasp new business systems and methods very quickly. He carries American adaptability, enthusiasm and dash with him, and these are worth more than linguistic or local custom knowledge.—F. F. Prentiss in System.

Want the last word on the science of advertising? See announcement (page 57) of Elmer Crawford's remarkable discourse on the subject "How to Advertise; Where to Advertise."

METAL MARKET

New York Metal Market, August 8.

Copper, Lake	$15.75	@15.80
Straight Tin		32.75
Spelter		5.80
Pig Lead	4.65	@ 4.70
Antimony (Cookson's)	17.00	@17.50

Chicago Iron Market, August 10.

Southern, No. 1 Foundry	$16.15@16.65
Southern, No. 2 Foundry	15.65@16.15
Lake Superior Charcoal	17.50@17.75
Lake Superior Coke Iron, No. 1 Foundry	17.00@17.25
Lake Superior Coke Iron, No. 2 Foundry	16.50@17.00

The week has been very quiet in pig iron. The demand has been light, although we note the sale of 15,000 tons of basic by a Tennessee company, on the basis of $13, Birmingham. The pig iron market in all centers has been firm, but Southern sellers have some difficulty in maintaining the basis of $12 for No. 2 foundry, Birmingham. The United States Steel Corporation has signified its desire to confer with the Bessemer Association late this month in regard to the purchase of pig iron for September delivery, says the Iron Trade Review. The fact that this conference is to be held will undoubtedly strengthen the market for Bessemer, although it is impossible to predict whether the views of the Corporation and those of the Association concerning price can be harmonized.

Merchant Pipe.—Demand shows an improvement over the tonnage sold in the weeks immediately previous, and mills look for a continuous betterment from now on. Prices are firm. Random lengths, f. o. b. Chicago, are quoted as follows:

MERCHANT PIPE.

	Steel. Black. Percent.	Steel. Galv. Percent.	Iron. Black. Percent.	Iron. Galv. Percent.
⅛ to ¼ inches	65.85	49.85	63.85	47.85
⅜ to ½ inches	69.85	57.85	67.85	55.85
¾ to 6 inches	73.85	63.85	72.35	62.35
7 to 12 inches	68.85	53.85	67.35	51.85

PLUGGED AND REAMED.

	Steel.	Steel.	Iron.	Iron.
1 to 4 inches	71.35	61.35	69.85	59.85

EXTRA STRONG PIPE.

⅛ to ⅜ inches	58.85	46.85	56.85	44.85
½ to 4 inches	65.85	53.85	63.85	51.85
4½ to 8 inches	61.85	49.85	59.85	47.85

DOUBLE EXTRA STRONG PIPE.

½ to 8 inches	54.85	43.85	52.85	41.85

WISE TO THE GAME.

It was at the conundrum party.

"What is it," began the pretty girl, "that is everywhere and in everything—something you cannot see and yet you know it is there?"

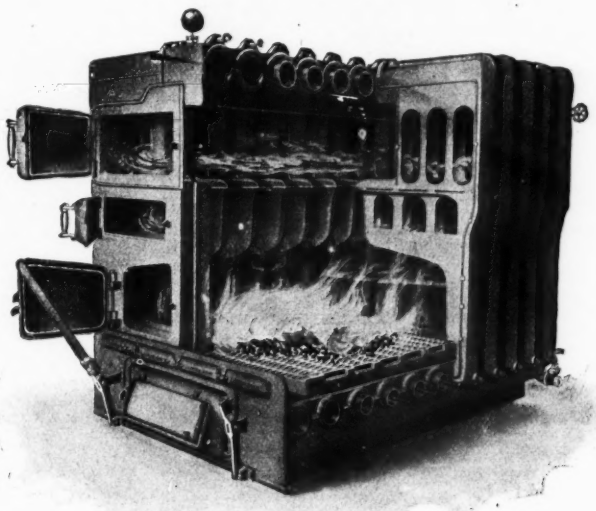
"Graft," spoke up the small boy whose father was in politics.

(Other reading matter on pages 40-52.)

Heavy Duty and Big Profits

CAPITOL BOILERS AND RADIATORS

Here's a boiler rating up to 8,775 sq. ft., steam, and 14,500 sq. ft., water (guaranteed), that can be installed anywhere with more profit to the fitter than any other on the market—and more satisfaction to the purchaser.



The reasons why:

STEAM

38-inch grates—3,000 to 6,000 sq. ft. Height (without trimmings) 72 inches. Height of water line, 63 inches.

50-inch grates—4,725 to 8,775 sq. ft. Height (without trimmings) 76 inches. Height of water line, 67 inches.

WATER

38-inch grates—4,950 to 9,900 sq. ft. Height 65 inches.

50-inch grates—7,800 to 14,500 sq. ft. Height 68 inches.

Compare these heights and water-line heights with other boilers claiming same capacities. Remember those **half**-sections — half the labor to install.

Write to us for information about more profits.

United States Heater Company

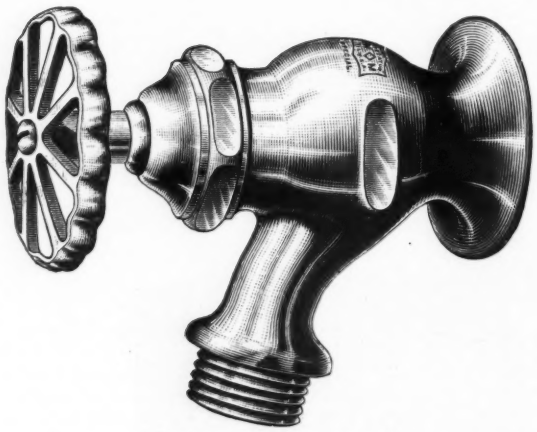
Home Office and Works: Fort Street and Campbell Avenue, DETROIT, MICH.

BRANCHES: 129 Worth Street, New York. 42 Dearborn Street, Chicago.

Sales Agencies: Hitchcock Supply Co., Springfield, Mass. J. H. Cunningham & Co. Boston, Mass. Kellogg & Stokes Stove Co., Denver, Colo. Plumbing & S. F. Supplies Co., Minneapolis, Minn.

MUELLER COMPRESSION WORK

SPECIAL GRADE SILL COCK



Three fourths actual size of ½ inch cock.

If the stem of a sill cock doesn't have a good thread bearing it will soon wear and vibrate in the body.

The body threads of Mueller Sill Cocks are long and deep enough to give the stem a good thread bearing from full open to full closed. It is held firmly in place and works without vibration.

Mueller Sill Cocks are made with bent or straight nose, with tee or wheel handle or loose key, and rough finish or nickel plated. The cock illustrated is the bent nose wheel handle pattern.

Each cock is carefully inspected and assembled, is given a 200-pound hydraulic pressure test as near like actual service use as possible, bears the Mueller trade mark and is *unconditionally guaranteed*.

We also make ground key and fuller work for plumbers' use. Catalogues upon application.

EASTERN DIVISION—Located at 254-258 Canal Street (Cor. Elm), New York City, carries a full stock of Mueller Goods.

THREE GRAND PRIZES Were awarded Mueller Water, Gas and Plumbing Goods respectively at St. Louis.

H. MUELLER MFG. CO.

DECATUR, ILL., U. S. A. NEW YORK, N. Y.

MUELLER PIPE REAMERS

RATCHET HANDLE PATTERN

C-035

Some reamers cut off the burrs well in some places but skimp them in others because the operator cannot hold them true in the pipe.

Mueller Pipe Reamers have a breast handle for holding them true while operating. They leave a clean reamed surface in the entire circle of the pipe.

Mueller Pipe Reamers have the blades relieved and are made in plain handle and ratchet handle patterns. The reamer illustrated is the ratchet handle pattern.

Each reamer is carefully inspected and assembled, is given an actual working test, bears the Mueller trade mark and is *unconditionally guaranteed.*

We also make ground key work, fuller work and compression work for plumbers' use. Catalogues upon application.

EASTERN DIVISION—Located at 254-258 Canal Street (Cor. Elm), New York City, carries a full stock of Mueller Goods.

THREE GRAND PRIZES Were awarded Mueller Water, Gas and Plumbing Goods respectively at St. Louis.

H. MUELLER MFG. CO.,

DECATUR, ILL., U. S. A. NEW YORK, N. Y.

MENTION DOMESTIC ENGINEERING

INDUSTRIAL STOCKS

The following are the prices bid and asked on the following industrial stocks, listed on the Chicago and New York Stock Exchanges, at the close of business on Thursday, August 10:

American Radiator Co., com	81	
American Radiator Co., pfd	130	
Trenton Potteries Co., com	20	21
Trenton Potteries Co., pfd	90	95
U. S. Steel, com	31	32
U. S. Steel, pfd	97¾	98
Republic Iron & Steel, com	21	21½
Republic Iron & Steel, pfd	78	79
Nat. E. & S. Co., com	22	22½
Nat. E. & S. Co., pfd	87	90
U. S. Cast Iron Pipe Co., com	30	31
U. S. Cast Iron Pipe Co., pfd	93	95

CHANCES FOR BUSINESS

Duquoin, Ill.—This town is contemplating the construction of a system of water works.

Iola, Kan.—Bonds to the amount of $40,000 will soon be issued for water works construction.

Gadsden, Ala.—The citizens have voted to issue bonds to the amount of $100,000 for water works and $30,000 for sewerage.

Marion, Ill.—Plans for a sewerage system have been completed. Marion is located in Marion county and has about 1,500 inhabitants.

Campbell, Neb.—A water works system will be constructed here in the very near future. Campbell is located in Franklin county and has about 500 inhabitants.

Parkston, So. Dak.—A system of water works will be constructed here in the near future. Parkston is located in Hutchinson county on the Chicago, Milwaukee & St. Paul Railway and has a population of about 500.

ASSOCIATION NEWS

The eighth annual convention of the Acetylene Association will be held at the Cadillac Hotel, Forty-second street and Broadway, New York, August 15 to 17, inclusive. In the announcement sent out by President Augustine Davis, of Elkhart, Ind., appears a long list of papers upon pertinent trade topics to be presented by well-known authorities. The reports of the chairmen of a large number of standing committees also promise much enlightenment on live trade conditions. An entertainment committee, of which L. S. Bigelow, of 253 Broadway, is chairman, has in charge the entertainment of the delegates.

The Master Copper Workers' Association will hold its next meeting at the Arena, West Thirty-first street, New York, August 24. A large attendance is expected at this meeting, as a number of important matters will be up for action, among them the question of establishing reciprocal relations of wider scope between the manufacturers and members of the association. Secretary Frank S. Hanley, 258 Broadway, New York, states that since its last meeting, held April 6, a very gratifying number of new applications for membership have been received from nearly every section of the country, showing that the interest in the movement is widespread and growing rapidly and that it is assuming National proportions.

PLUMBING LEGISLATION

A new ordinance has been prepared for St. Joseph, Mo., by City Counselor Norris making it the duty of the plumbing inspector to pass upon gasfitting as well as plumbing, and requiring him to include the gasfitting in his certificates. This is the outgrowth of a disagreement between several of the master plumbers and the St. Joseph Gas Company. The plumbers say the gas company wants a monopoly of the gasfitting business of the city, and that, with this end in view, it refuses to turn on gas in a new house unless the gasfitting was done by its agents, alleging as its reason that the work is not properly done. The new ordinance takes away from the gas company the authority to say whether or not a job of gasfitting conforms to the rules, and vests it in the city plumbing inspector; and requires the company, upon presentation of the inspector's certificate as to the effectiveness of the work, to turn on the gas. The ordinance was prepared at the instance of R. B. Davidson, former city plumbing inspector, now a master plumber. It will probably be introduced to the city council at its next meeting.

The Workingman and the Law.

Several recent court decisions are paving the way to a better understanding of the relation between labor and employer as well as establishing the fact that every man has the right to earn a living without necessarily displaying a union card.

When the unions come to understand that there is nothing to be gained by attempting to evade legal responsibility for their acts or their contracts, then will they come to a better organization and a better appreciation of the rights of others, with the consequent result that the constant friction between employer and employee will be materially lessened.

In Massachusetts recently a non-union bootmaker, discharged in obedience to the demand of a union officer, has recovered damages from the unionist. The manufacturer had a contract with the union, binding him to employ none but its members. The non-union worker's suit was decided in his favor by all the legal tribunals, up to the Supreme Court of the Commonwealth. An effort will now be made by the defendant to appeal it to the Supreme Court of the United States. The union of bootmakers is an incorporated society, and the final decision will be of vast importance.

In New Jersey a member of a hatmakers' organization whose "union card" was taken from him by the secretary of a "local," on the ground that he had not paid his dues, sued to recover $300 from the organization on the ground that he had been unjustly deprived of the opportunity to earn his living. The jury returned a verdict for the sum named.

A New England corporation which had recovered a verdict against a labor organization, collected a part of the sum by attaching the pay and property of the individual members of the union.

Readers of Domestic Engineering are urged to examine the advertising pages of this paper. Enterprising manufacturers and jobbers are showing novelties for plumbing and heating men. There is no better way to keep abreast of the times than by reading our advertising pages. In writing advertisers please mention Domestic Engineering.

SO THAT HE WHO RUNS MAY READ.

Naval Constructor D. W. Taylor describes how artificial ventilation is obtained on shipboard....Page 24
M. E. Wells discusses the effect of scale in boilers ..... Page 25
The vital question of how perfect joints of drains can be made, solved by James G. D. Armstrong ..... Page 26
The new system of contracting originated by Frank G. Gilbreth of New York.....Page 29
Notes on different systems of automatic sprinkler service ..... Page 29
Reciprocity between jobbers and manufacturers of plumbing supplies, as seen from the standpoint of a manufacturer ..... Page 30
The United States patent laws—Practical hints for inventors ..... Page 47
How factories can be ventilated .....Page 50
Thomas A. Edison gives would-be inventors valuable advice ..... Page 50
Establishing foreign trade—The best way of doing it .....Page 36
Kinks and Wrinkles by "The Artful Dodger"..Page 27
Journeymen plumbers at Lynchburg (Va.) and Greensboro (N. C.) go out on strike.....Page 45
New ordinance for St. Joseph (Mo.) to end fight between master plumbers and the St. Joseph Gas Company ..... Page 40
John F. Mulvey, a prominent master plumber of Woonsocket (R. I.) dead .....Page 43
Robert Kohler, president of J. M. Kohler Sons Co., of Sheboygan, Wis., dead.....Page 32
Paterson (N. J.) master plumbers enjoy fourth annual outing ..... Page 44

CHICAGO

"NOTHING DOING."

If any of the Chicago plumbing and heating fraternity has been guilty during the past week of doing anything worthy of more than passing notice he has been very careful to keep it from the ears of the Domestic Engineering man.

"Off on his vacation" is the answer given in response to two out of every three telephone inquiries as to the whereabouts of the "boss," from which it may be inferred that a fair majority of the Chicago plumbers and fitters are finding time in spite of a reasonably busy season to lay aside the cares of business and indulge in a summer holiday.

Executive Clerk Crosby, of national headquarters, reports "All quiet along the Potomac." There are neither wars nor rumors of wars, but the dove of peace, concerning which we have heard so much since the meeting of the Russo-Japanese plenipotentiaries, hovers over the association in all parts of the country.

The Chicago Master Plumbers' Association is no exception to the rule, and officers of the organization say "Nothing doing" when questioned as to association affairs. It is understood that a goodly number of candidates have petitioned to be put through the mystic rite, but the goat is also enjoying a vacation, and would-be members will have to wait till he comes back next month.

William F. Costello, secretary-treasurer of the National Association of Steamfitters, has removed his headquarters to Chicago from New Haven, Conn. His office will be at 352 Dearborn street, where the official journal of the organization will be published. John Mangan of Chicago is associate editor.

The new Chicago plumbing ordinance which was passed by the city council some time ago, "to become effective when printed," is still hanging fire because two rival printing firms claim to have the exclusive right to print copies of it. Like most matters involved in legal tangles the probable date of its final appearance is altogether problematical. In the meantime the Sanitary Bureau is working under the old ordinance, which still holds water in spite of sundry and various attempts to shoot it full of holes.

Our strenuous friend C. J. Stein, of 479 State street, remarked that business is rather quiet with him just now. Cross-examination proved, however, that he really doesn't know when he is busy. Here are a few of the jobs that are claiming a little of his attention: Plumbing of the Harvard, Davis and Smythe schools; an office and store building at Eighteenth street and Ashland avenue; a church and school on Nineteenth place; a sixteen-flat building at Fiftieth and Homan; a sixteen-flat building at Fifteenth and Trumbull; a five-flat building on Homan near Sixteenth. Presumably these are child's play after the fifty-two flat job which he recently completed at Fifty-fifth and South Park after finishing up his big contract at the White City amusement resort.

The yellow fever epidemic at New Orleans has tied up very effectually work on a contract for a large power installation which the Hanley-Casey Company of Chicago recently signed up with a New Orleans manufacturing concern. "It is practically impossible to get fitters to go to the fever stricken city," said Tom Hanley, "even if we were willing to risk our men by sending them there. The job will have to stand until the fever has been stamped out." In view of the fact that the Hanley-Casey people are just beginning to get busy on a hundred thousand dollar contract for the Jamestown Exposition management and have a goodly string of work at other points, they do not seem to be losing any sleep over their possible loss of the New Orleans contract. Among other work on which they are now engaged is the Kinlock office building at St. Louis, a handsome hotel at Clinton, Ia., and the Eastman kodak factory in Chicago.

"Skinny" Madden, of the local steamfitters' union, has been brought into unsavory notoriety during the past few weeks as a result of his alleged connection with the "wrecking crew" which has twice broken up meetings of the Chicago Federation of Labor by the slugging method while a ballot for the election of officers was in

progress. President Dold has announced that a third attempt will be made on Sunday, August 13, to hold the election, this time under the protection of two hundred stalwart athletes who have volunteered their services in behalf of law and order. In his call President Dold refers to the rioting on the occasion of the two former attempts to hold an election and says that the Federation has come to the dividing of the ways. Henceforth the law-abiding element must gain and maintain control of the organization or turn it over once for all to the radicals, in which event he prophesies its rapid decay and disintegration. If conditions in the Federation are as bad as recent events would seem to indicate, it is certainly high time that the "law and order" unionists gain the upper hand or leave the organization to the tender mercies of the rowdies who have of late terrorized its meetings.

CLEVELAND

I. Koblitz & Son have been awarded the contract for plumbing the parish house to be erected on Hurd street for Rev. Father Mylott.

The city authorities are advertising for proposals for the erection of two shelter houses, one at Brookside and one at Woodland Hills Parks.

The contract has been let for the Jewish synagogue to be erected on Willson avenue. It will be of steel, stone and brick construction, 88x140 feet and will cost $50,000.

School sanitation is to be made the subject of special attention by the city's school physicians during the coming school term in addition to the enlarged work inaugurated last term.

The contract for plumbing the new branch library on Crawford road near Hough avenue, has been let to Dewstoe & Brainard for $1,177, and the heating, $1,802, to John Thomson.

The annual outing of the Master Plumbers' Association of Cleveland was held at Willough Beach Park on August 10. Entertainments of various kinds were provided and the occasion was one of enjoyment to the plumbers and their wives.

Contracts have been let for a bachelor hotel on Euclid avenue. It will be 33x125 feet, four stories, fireproof construction. There will be sixty rooms, single or en suite, with baths, stationary washstands, hot and cold water and both gas and electric lights in every room. The building will be heated with steam.

MIDDLE STATES

T. L. Whittaker has purchased the plumbing business of Killeen & Haverhamp at Dundee, Ill.

J. I. Madden has been appointed plumbing inspector at Springfield, Ill., to succeed Edward Anderson.

W. E. Ehret, of Belleville, Ill., has been awarded the contract for the installation of a heating plant in the Lincoln School at his bid of $1,550.

Wallace Bros.' plumbing shop at the corner of Fourth and Ferry streets, Lafayette, Ind., was struck by lightning last week. Considerable damage was the result.

Sealed proposals for the installation of a heating plant in the poor house at Galena, Ill., will be received at the county clerk's office in that city until 10 o'clock a. m., August 22.

Joseph Murphy, of Marion, O., has been awarded the contract for the construction of a sewerage system and disposal plant at London, Ohio. The contract amounts to $52,000.

Charles Kelley & Co., of Toledo, Ohio, have been awarded the contract for heating and plumbing the old Aldine Hotel. The amount of the contract is in the neighborhood of $4,500.

Samuel Clark, traveling representative of A. Harvey's Sons Manufacturing Company, of Detroit, Mich., died Saturday, August 5, at Sault Ste. Marie, Mich., from neuralgia of the heart. Mr. Clark was in his 66th year and came to Canada about 35 years ago as a member of the Seventy-eighth Highlanders, Ross-shire Buffs, and did garrison duty in the Dominion before he came to Michigan. He was a prominent member of St. Andrew's Society and widely known throughout Detroit.

NOTES FROM THE WEST

Thomas Young, of Biloxi, Miss., has on hand contracts for plumbing sixteen new houses in Biloxi.

S. O. Spencer, of Fort Scott, Kans., has retired from the plumbing business to enter another line of trade.

D. D. Briggs, of Meridian, Miss., has lately completed the plumbing in a new building in Meridian for Miazza & Woods.

J. B. Smith, of Vicksburg, Miss., is at present engaged with the plumbing in four new houses in different sections of Vicksburg.

J. E. Boyle & Co., of Colorado Springs, Colo., have purchased the plumbing establishment of E. C. Nash, of Cheyenne, Wyo.

H. L. Lathrop, of Fort Worth, Tex., has been awarded the contract for heating the new school building at Alexander, Tex., at his bid of $1,400.

The Meridian Plumbing Company, of Meridian, Miss., has secured the contract for the plumbing in ten new residences in different parts of the city.

J. L. Andress, formerly located at 407 Crawford street, Vicksburg, Miss., has moved his plumbing business into handsome quarters at 517 South Washington street.

Pueblo Plumbing Company, of Pueblo, Colo., has been awarded the contract for the installation of a heating system in the Irving Place school at its bid of $4,069.

Ellis & Foster, of Waterloo, Iowa, have secured the contract for the plumbing of the Iowa Dairy Separator Company's new buildings. The amount of the contract is about $3,000.

The Modern Plumbing Company, of Des Moines, Iowa, has been incorporated with a capital of $8,000. The incorporators are: Frank O. Anderson, Charles Veldne and W. E. Moorhead.

A. V. Rogoski, of Little Rock, Ark., is progressing with the plumbing and hot water heating in a new flat building for Jacob E. Mayer in Little Rock, the contract amounting to about $4,000.

Spinks & McPhillimy have lately opened a plumbing shop at Meridian, Miss. In the way of a start off they have landed the contract for the plumbing in the new Wagner building in that city.

Gowdy & Galloway, of Little Rock, Ark., are busy with the plumbing work in a new building for the Scott Mayer Commissary Company in Little Rock. They also have under way the plumbing in three other large buildings and also in nine new residences.

C. P. Wetherbee and L. Cohen, prominent mill supply men of the South, and both conducting a large business at Meridian, Miss., are away on a fifteen days' trip visiting different sections of the East.

William Thiedemann, of Davenport, Iowa, has been awarded the contract for plumbing the Ochs building in that city, and De Hart & Steckel Co. secured the contract for heating the same building.

J. J. Ledwige, of Texarkana, Ark., has signed the contract for the plumbing in the Miller county jail in Texarkana. He also has under way the plumbing in twenty-three new structures in that city.

Petit & Saunders, of Main street, Little Rock, Ark., have lately added to their list of work the plumbing in the new Medical office building in Little Rock and also in thirty new residences now in the course of erection in different sections of the city.

The Waggoner Plumbing Company, of Vicksburg, Miss., has succeeded to the plumbing business of C. P. Waggoner. This energetic concern has recently completed the plumbing in the new Johnston building and in Mr. Spangler's elegant new residence, both of which structures are in Vicksburg.

Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until 3 o'clock p. m. August 24, 1905, for the steam heating and ventilating apparatus, etc., complete in place, for the United States courthouse and postoffice building at Lincoln, Neb., in accordance with drawings and specifications.

GREAT NORTHWEST

R. F. Roth will soon open a plumbing establishment at Tomahawk, Wis.

Joseph Sutter, of Madison, Wis., has secured the contract for the installation of a new plumbing system in the third ward school building.

W. S. Patterson & Co., of Appleton, Wis., have been awarded the contract for heating and ventilating the high school at Berlin, Wis. The consideration is $7,000.

Thomas Riley has purchased the interests of Messrs. Holt and Dahlby in the firm of Holt, Dahlby & Riley at Fargo, N. Dak., and will hereafter conduct the plumbing and heating business in his own name.

NEW YORK NEWS

D. R. Douglass, dealer in pipe covering, formerly located at 69 Centre street, has removed to 525 West 54th street.

C. P. Monash, general manager of the Monash-Younker Company, of Chicago, spent this week at its New York office, 88-90 Centre street.

A. L. Townsend has closed his plumbing business at Saratoga Springs, N. Y., and moved to Whitehall, N. Y., where he soon will open a new plumbing establishment.

The Fentzlaff Heating Company, of 160 Fifth avenue, is doing the hot water heating in the new residence being erected for Chas. L. Schultz, in Montclair, N. J. Two 3,000-ft. cast iron boilers are being used.

Robert J. Keane, son of M. J. Keane of Boston, has accepted a position with the Naturo Company of Salem, N. J., and will represent that company in New Jersey and New York territory, co-operating with its agents, the John Simmons Company.

The Van Loon-Hedden Co., of Schenectady, N. Y., has been incorporated with a capital of $15,000 to carry on a general plumbing business. The incorporators are: Edward S. Van Loon, of Albany; Floyd S. Hedden and Charles C. Weaver, of Schenectady, N. Y.

Alfred F. Howe, of the Borden Company, Warren, Ohio, who recently returned from Europe, where he had spent several months in the interests of his company, has opened an office in Room 812 Flat Iron building, 23d street and Broadway. Mr. Howe will have charge of the company's Eastern and export business.

The Roosman & Bracken Co., of 11 East 22d street, has been awarded the contract for the steam heating and ventilating in the new Erasmus Hall high school being erected in Brooklyn. The contract amounts to $22,500. This company has also been awarded the contract, amounting to $32,000, for heating and ventilating the new school being erected in Long Island City, known as No. 4. It is also engaged with the plumbing in the new Ditson mansion being erected at 19 East 37th street.

The Thompson-Starratt Company, of 51 Wall street, has established a general heating contracting department, with offices and pipe shops at 194 Fulton street. William Gordon, for the past fifteen years with Gillis & Geoghegan, is in charge of this department. The company has in hand at the present time a considerable number of contracts for large operations, among them being the Title Guarantee & Trust Company's building at Broadway and Maiden Lane, in which a vacuum system will be installed; also the new building being erected for the same parties at 175 Remsen street, Brooklyn, and the new Crescent Athletic Club, of Brooklyn, which includes the installation of an ice plant.

BOSTON and NEW ENGLAND

Hanlon & Murphy, of Hartford, Conn., have been awarded the contract for plumbing the new addition to the Northwest school. The contract for heating has not been let.

The Sanitary Plumbing and Heating Corporation, of Danbury, Conn., has been incorporated with a capital of $10,000. The incorporators are: Andrew R. Jones, John R. Hill, Frank T. Mead, Henry J. Roth and Fred E. Hall, all of Danbury, Conn.

John F. Mulvey, treasurer of the John F. Mulvey Plumbing Company, of Woonsocket, R. I., died of heart disease on Wednesday, August 2, while connecting the plumbing system of a new house with the water main. Mr. Mulvey was born in Auburn, R. I., in 1850, and learned the plumbing trade with Baker & Baker of Providence. About twenty years ago he engaged in business at Woonsocket and conducted a successful plumbing business up to the time of his death. He is survived by two sons and two daughters, his wife having died about a year ago.

FAVORS PROFIT SHARING.

Dr. John H. Gray, professor of economics in Northwestern University, and vice president of the American Economic Association, lately declared that the only solution of the labor problem was profit sharing. He said it had been proved a success in practice. "Machinery has made two classes whose interests are not alike and cannot be," he said. "The old relations between employer and employed never can be resumed. Strikes and warfare are the inevitable condition until the employe is recognized as having an interest in the business."

PHILADELPHIA

P. Gormly, of North Tenth street, is placing the heating in St. Vincent's Home in Germantown.

The Standard Fuel Saving & Furnace Company has opened an office at 32 North Seventieth street.

George L. Swyler, for several years business agent of the Philadelphia Association of Master Plumbers, has severed his connection with that organization.

The trade still continues busy. The plumbing and heating contractors are overladen with work, while the jobbers and boiler men are all wearing beaming faces.

The Allentown Association of Master Plumbers, of Allentown, Pa., had its annual outing on Thursday, August 3, and a more enjoyable time could not be spent.

Robert Scott, of 1716 Ludlow street, is engaged with the plumbing and heating installation in the new Engineering building at the University of Pennsylvania.

Roberts Leineau, of South Seventh street, has just landed the contract for the plumbing installation in the new annex to the Marlborough House at Atlantic City, N. J.

Owing to the death of W. C. Jennings, the boiler and radiator business for some time conducted at 631 Arch street by him will in the future be carried on by Charles B. Sands.

Marsh & Oldacre, of 1717 Chestnut street, are heating the new Theta Delta Pi Fraternity House at Lafayette College, Easton, Pa. They also have under way the heating installation in the residence of Dr. Charles B. Penrose at Devon, Pa.

The Makin Heating Company, of 18 South Seventh street, has lately completed the heating in the residence of George A. Armour at Princeton, N. J. They have also recently finished the heating work in four large houses for Bailey & Bassett at Villanova.

So successful from every standpoint was the recent outing at Essington given by the Philadelphia Master Plumbers' Association that another day's recreation is to be arranged for some time next month. The Orchard will again be the scene of festivities and the program as enjoyable as ever.

The Philadelphia master plumbers have been most unfortunate of late in the death of several of their brother craftsmen. It is with regret we hear of the recent death of John Borden, senior member of the firm of Borden & Bro., plumbing and heating contractors of 639 North Nineteenth street.

In an article entitled "How Inventions Are Made" the "World's Work" says: "Every great manufacturing concern maintains, under one name or another, an 'inventions department,' employing men who are paid various salaries simply to develop inventions. They are supplied with every mechanical appliance to facilitate their work; the bills are paid by the company, and every invention they make is assigned to the company 'in consideration of salary and one dollar.'" The General Electric Company, at Schenectady, N. Y., for example, employs about 800 men who devote much of their time to developing new ideas. It spends $2,500,000 a year in this development work. The Westinghouse companies do the same thing; so does every progressive manufacturing concern of any consequence in the United States. And it is these unknown men, grappling with the every-day, practical problems of great manufactories, who make most of the inventions of immediate commercial value.

NEW JERSEY

The Paterson (N. J.) Master Plumbers' fourth annual outing, held at Staunch's Hall, Coney Island, Saturday, August 5, was one of the most enjoyable of the social events of the season and said to be the largest in the history of that redoubtable association. The weather man very kindly provided an ideal day for such an occasion, not too warm for comfort, but still warm enough to add to the enjoyment of the refreshing sea breezes and the attractions provided to relieve the stress of warm weather found at this far-famed resort. About 200 participated in the holiday. A liberal sprinkling of the jolly supply men lent their genial presence, and were found at the fore in seeing the sights and entertaining their friends in a royal manner. According to schedule, the train left Paterson at 7:15, connecting with the 9 o'clock boat from New York. Having arrived at 11 o'clock, repairment was at once made to Staunch's, where a substantial breakfast supplied that "indefinable something" so necessary as a prelude to an enjoyable holiday. This being over, the party divided up into small groups and proceeded to enjoy the sights until 3:30, when all assembled at the pavilion prepared to do justice to the good things provided for the satisfaction of the inner man. The menu, a model of cleverness, kept the boys guessing, but the mysterious terms were all found to represent a dish worthy of its appellation, and read as follows:

Price List
Supply Houses
Drift Plugs Fuller Balls
Cutting Oil
Apprentice Boys' Delight, Turn Pins
Sheet Lead with Plunger Washers
Gas Tips
Committee
Lead Bends Stuffed and Vented
Asbestos Cement
Members Dipped in Solder
Seat Bumpers
Wiping Solder Cake of Lead
Passaic River
Oakum
Gasoline on Tap

At 6 o'clock the pleasure-seekers again divided into groups and hied away home or proceeded to further explore the mysteries of the resort as fancy led them.

Odds and Ends Returned.

William McDonald, chief plumbing inspector of Paterson, was an honored guest.

State President White is a born leader. Did you see him pilot the bunch at Luna?

Alfred F. Howe, of the Borden Company, was on hand as ever radiating geniality and showed never a trace of his recent European labors.

G. B. Wiggins, of the United Brass Manufacturing Company, of Cleveland, was omnipresent and remembered his friends with colored post cards.

J. L. Mahon and Joseph A. Samuelsberger, two new master plumbers who have recently embarked in the business in Paterson, were in evidence.

The veteran James T. McNab was again with the boys and received many congratulations on account of his recovery from his recent serious illness.

"A prince among good fellows and never known to miss an outing." That is the enviable reputation borne by James J. Harlin, the popular jobber of Paterson.

He bears not the slightest resemblance to one, but H. S. Hounslea, of the New York branch of the Crane Company, said he represented the Elephant. Did you see that clever paper weight?

The excellent work of the able committee was apparent to everyone in the smoothness with which every detail of the affair was carried out and in the large proportion of the membership present. As hosts of the first water the committee fully sustained the reputation of the association as princes of entertainers. It was composed of the following gentlemen: George S. O'Neil, chairman; J. H. White, James J. Maher, James T. McNab, Robert Beaumont, William Delhagen and Frank Vreeland.

The Paterson Journeymen Plumbers' Association held its annual outing at Cranberry Lake the same day.

SOUTHERN NOTES

Moses Daniel, of Brunswick, Ga., has contracts for the plumbing work in three new houses in different sections of Brunswick.

The Harris Plumbing Company has opened a new business in the Rumney building, Albany, Ga. E. P. Harris is manager of the company.

L. M. Roberts, of Jacksonville, Fla., is busy with the plumbing work in the county jail at Liberty and Church streets, Jacksonville, Fla.

The Hayden Plumbing Company, of Birmingham, Ala., will do the plumbing in ten new residences in different sections of Birmingham.

The Bessemer Cornice Works, of Bessemer, Ala., has contracted for the plumbing in five elegant new residences, situated in Bessemer.

Wilton Ellin is a new addition to the ranks of master plumbers in Memphis, Tenn. His place of business is located at 3 South Second street.

McGowan & Couillens, of Second street, Memphis, Tenn., have contracted for the plumbing in eight new houses in different sections of Memphis.

Robert L. Orr, plumbing inspector in Norfolk, Va., was prostrated by heat last week. He is reported recovering, but has not been able to leave his house.

McGowan & Couillens, of Second street, Memphis, Tenn., have closed a contract for the plumbing in a three-story warehouse at Main and Washington streets.

Brown & Borum, of 52 North Second street, Memphis, Tenn., are engaged with the heating installation in the steamship Oleander for the United States government.

The Birmingham Paint & Roofing Company, of Birmingham, Ala., will open a branch store at Ensley, Ala., and will establish a plumbing department in connection therewith.

J. A. Bailey & Co., of 70 South Second street, Memphis, Tenn., are at work upon the plumbing in the new Canter building on Front street and in another new structure on South Main street.

L. J. Leahy, of Mobile, Ala., is one of the busy men of his city. The plumbing and heating in five elegant new residences and also in a large flat building might be mentioned as a partial list.

A new addition to the ranks of the plumbing craft is the firm which has recently opened an establishment at 191 Madison street, Memphis, Tenn., under the name of the Memphis Plumbing & Plating Company. The new company is under the management of Ben F. Carr.

Stiefvater & Charlton, of 405 Baronne street, New Orleans, La., have signed a contract for the plumbing in a new apartment house at Calhoun and Saratoga streets. They also have under way the plumbing in twenty new residences in different sections of the city.

The Tom Wilcox Plumbing & Supply Company, of 116 East Ninth street, Chattanooga, Tenn., has succeeded to the business of T. S. Wilcox. The new company, which is incorporated with a capital of $12,000, is at present engaged with a $14,000 contract for the plumbing and heating in the Lupton apartment house.

Sealed proposals will be received until 10:30 a. m., August 28, for constructing, plumbing and heating one frame barrack and one brick quartermaster and subsistence storehouse at Fort DuPont, Del. Information furnished on application to Captain Louis E. Garrard, Jr., Q. M., Delaware City, Del.

Cornes & Colsten, who occupy well equipped quarters at 15 Market Square, Chattanooga, Tenn., have lately bought out the plumbing business of Carlin & Cornes. R. O. Carlin, who after the dissolution opened a shop at 820 Cherry street, has given up his place at that address to move into a larger store at 816 Georgia avenue.

Only twenty-five permits were issued by the plumbing inspector at Birmingham, Ala., during the month of June, which is taken to indicate that the people of that city are very slow about having their sewer connections made in accordance with the requirements of the ordinance. Steps are being taken to enforce the ordinance more stringently.

Journeymen plumbers, of Lynchburg, Va., have gone on a strike because demands, made two months ago, for $2.75 for nine hours' work instead of $2.50 and $2.75 for ten hours' work have not been granted. The men belong to an independent union and work for eight firms. The latter say that, although having much work on hand, they will not be seriously inconvenienced.

Fifteen journeymen plumbers employed in one of the largest establishments of Greensboro, N. C., went out on a strike last week because they were provided with bicycles and asked to use them on their way to work in emergency cases. It is thought that the strike will spread to the other plumbing shops in the city, as the master plumbers think the demand is most reasonable.

PACIFIC COAST

The United States Blowpipe and Hydraulic Works' plant at Sixth avenue, South and Pacific street, South Seattle, Wash., was totally destroyed by fire on Friday, July 28. The loss is estimated at about $18,500, with insurance of about $7,000.

The following proposals for the heating of the Model School at Vancouver, Wash., were received last week: William Ralph, $5,383; McLachlan Brothers, $3,871; Wilband & Morrow, $3,500; A. M. Forbes & Co., $3,475 (the latter bid was imperfect and was thrown out). Wilband & Morrow were awarded the contract.

Sealed proposals will be received at the office of the Quartermaster at Seattle, Wash., until August 24, 1905, 11 a. m., and then publicly opened, for the construction, plumbing, heating and electric wiring of five public buildings at Fort William H. Seward, Alaska. Bids will also be opened at the same time by the Quartermaster at Fort William H. Seward, Alaska.

We do not fill our reading columns with puffs and write-ups. Our subscribers pay for reading matter and they get it straight. But our advertising pages contain the cream of the trade's offerings and repay study. In writing advertisers please mention Domestic Engineering.

BOOKS AND CATALOGUES

Radiation and Decoration is the title of a very handsome catalogue received from the American Radiator Company, Chicago. It is designed to show "not only how well American radiators are made, but also how simple are the processes of location and decoration which assist to make them blend and harmonize with the architecture and furnishings of the rooms in which they are placed!" The

cover design is a reproduction of a bas-relief by Isidore Konti, a famous New York sculptor whose works have attracted much attention. The design, which the editor considers worthy of reproduction here, represents allegorically the spirit of comfort which hovers over the modern home and the busy marts of trade with the advent of modern methods of heating and ventilation. Evidently intended for distribution among architects and householders, this latest American Radiator catalogue contains many suggestions which could not but be of value to the practical fitter.

The unique features of "Never-Split" closet seats are illustrated and described in an exceptionally handsome booklet designed and executed by Hollister Brothers, of Chicago. Various grades and finishes are shown in excellent half-tone reproduction. The booklet is issued by the Never-Split Seat Company, of Evansville, Ind.

Red and black ink are used with telling effect in the new catalogue of steam and hot water boilers being sent out by the International Heater Company, of Utica, N. Y. In sectional views a red-hot fire is made to appear in the fire box of the boilers in such realistic fashion as really to add to the discomforts of a warm day. On the whole, however, the catalogue creates an excellent impression.

The Boynton Annual for 1905 has made its appearance, the issue for 1905 being a 48-page book substantially bound. It is given over to the company's line of steam and hot water boilers, another booklet dealing with the heating furnaces which constitute another branch of the business. A conspicuous line in the title page reads "Over 200,000 Boynton Heaters Now in Use. Established 1849." Copies may be obtained by addressing the Boynton Furnace Company, New York or Chicago.

LATE WANT ADS

WANTED—STEADY POSITION BY A SOBER, RELIABLE man; fifteen years' experience with steam and hot water; can estimate and take charge of work; married; any locality. Address No. 345, care of DOMESTIC ENGINEERING, 64 N. Jefferson St., Chicago. 8-19

TRAVELER WITH GOOD CONNECTIONS IN CANADA would like to enter into correspondence with responsible firm doing business with plumbing and steamfitting trade; A1 record. Address No. 344, care of DOMESTIC ENGINEERING, 58-64 N. Jefferson St., Chicago. 2-12

WANTED—FIRST-CLASS, A NO. 1 MAN TO TAKE CHARGE of polishing and plating room in a large factory making a full line of plumbers' supplies. Must be a practical polisher and plater and be able to handle his department in an up-to-date manner. Give age, experience, where employed at present, references, etc., addressing N 346, care of DOMESTIC ENGINEERING, 58-64 N. Jefferson St., Chicago. 8-12

THE UNITED STATES PATENT LAWS.*

Under the patent laws now in force in the United States any person who has invented or discovered any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement thereof, not known or used by others in this country before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereor, or more than two years prior to his application, and not in public use or on sale in this country more than two years prior to his application, unless the same is proved to have been adandoned, may, upon payment of the fees required by law and other due proceedings had, obtain a patent therefor.

It may be remarked here that the word "discovered" in this section of the statute means "invention."

It will be noted that foreigners have the same right under this law as citizens of the United States.

The first requisite to the securing of a patent is the making of an invention. Just what invention is or what it takes to constitute an act of invention is a question that has been discussed by the courts and by text book writers many, many times, and it is a question which cannot be answered by definition. I say this, notwithstanding that definitions of the term "invention" will be found in many text books and in many decisions of the courts. Suffice it to say that invention comprehends a new idea of means and it must be something beyond the scope of merely mechanical effort.

Having made an invention, the next step in the process of securing a patent consists in the preparation of an application and the filing of the same in the Patent Office. This application comprises a petition to the Commissioner of Patents, requesting the grant of the patent for the invention disclosed in the application, an oath answering to the requirements of the statutes, a specification descriptive of the invention, and such specification must be concluded with a claim or claims specifically pointing out the improvement or invention. If no application has been made in a foreign country, the oath should set forth that the applicant is the original and first inventor of the invention disclosed in the application and described and claimed in the specification; that such invention was never known or used before his discovery or invention thereof; that such invention had not been patented or described in any printed publication in the United States of America or any foreign country before his invention or discovery thereof, or more than two years prior to his application; that the said invention had not been in public use or on sale in the United States for more than two years prior to his application, and that no application for foreign patent had been filed by him or his legal representatives or assigns in any foreign country prior to his application in the United States. If, however, applications for patents in countries foreign to the United States have been made at the time of the filing of an application in the United States, it is necessary for the applicant to name the foreign country or countries in which such applications have been made, giving the date of the filing of the same.

The claims are necessary to a complete specification. The specification must, of course, be signed by the applicant, who in nearly all cases is the inventor, and the appliction when forwarded to the Patent Office must be accompanied by the first government fee of $15. Where the application relates to an invention which can be graphically depicted, it is necessary to prepare and file drawings with and as a part of the application.

If any one of the parts above referred to are omitted, the application will not be accepted by the Patent Office, and the same will not be filed until all of the parts have been received by the Patent Office.

After an application has been received by the Patent Office, it goes to the Application Division, where it is classified, and is then forwarded to the division in the Patent Office in which is to be found the class of machine or art to which the invention belongs. Applications re-

*Communicated by N. C. Anderson, at a stated meeting of the Franklin Institute.

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ceived in the office are examined in regular order, according to their filing dates.

Before the claims of an application are allowed, careful examination of the prior art is made, and only such claims are allowed as distinguish from the constructions disclosed by the patents and other publications discovered by the examiner in his search of the art.

As a rule these examinations are carefully made, though, as you will readily understand, where several hundred examiners and assistants are employed, some of them are more careful in their work than others. The more care taken in the search and examination of the records in the Patent Office, the more likely is it that the patented claims will be valid.

It frequently becomes necessary to amend the claims, perhaps many times, before they can be brought into such shape that they distinguish from the art.

There is one thing that should be understood by all applicants for patents, and that is that the claims of a patent are of the very greatest importance; in fact, I should regard the claims as the most important part of a patent. Unless the claims are well drawn and unless they cover well the invention forming the subject matter of the patent, the patent loses much of its value.

These phraseology of the claims should be accurate. It is as necessary that the elements or parts entering into and forming the combination set forth in a claim should be stated and put together with exactness and precision as it is that the same elements be fitted together with exactness and precision in the machine itself.

As I have already said, the claims of a patent should be drawn with very great care, and should be made as accurate and as exact and as much to the point as it is possible.

I am sorry to say, however, that in many, many instances claims are vaguely and loosely drawn. This in some instances is due to a lack of knowledge of what the invention really is; in others it is a lack of ability to express ideas clearly in writing; in others it is perhaps a lack of effort; and in others it is perhaps due to a lack of proper time; but whatever the cause may be, failure to secure good claims is a misfortune so far as the patentee is concerned.

A writer in the Forum, referring to the difficulty of claim writing, has said: "It takes a very experienced hand to avoid defects which will nullify the patentee's proper advantage. An omission is fatal; an addition is fatal; and a vagueness is fatal."

Broadly considered, the claims of an application may be divided into generic and specific claims. If the invention disclosed in an application will support a broad or generic claim, such a claim should by all means be included. But in addition to such claim, specific claims also should be included because it is very much easier to anticipate a broad claim in the prior art than it is to anticipate a specific claim, and it may happen, if the claims of the patent are ever subjected to litigation, that the patentee would be able to sustain the validity of the specific claim but would be unable to sustain the validity of the generic claim. In such cases, the patent, by reason of the presence of the specific claim, would still be of value to the patentee, while, on the contrary, if it had included only the generic or broad claim or claims, which had been anticipated, the value of the patent would be entirely destroyed.

It is not always so, but, generally speaking, a broad claim includes a small number of elements in combination, while a specific claim will include a greater number of elements in combination, and these elements may be still further affected and narrowed by qualifying limitations.

It sometimes happens that an inventor, who fully understands the details and principles of his invention, concludes that he is better fitted to write his specifications and claims, that is to say, is better fitted to prepare his application for the Patent Office than someone who has had experience in the writing of specifications and the drawing of claims and therefore undertakes to do this work. It is very unusual to find an inventor who has had sufficient experience to prepare the specification and claims of an application properly, and the chances are about 100 to 1 against his succeeding in drawing claims which adequately protect his invention.

After the application has been placed in condition for allowance, it is allowed by the examiner, after which it goes to the Issue Division of the Patent Office. Then, upon the payment of the final fee of $20, the patent is printed, the grant is prepared and is signed by the Commissioner of Patents, and the patent is issued under the seal of the Patent Office.

Many inventors suppose that when they have secured their patents their troubles are over, but the fact is that if the invention is of any considerable value or worth, the patentee will be beset by a horde of infringers who will attempt to use the invention and secure the benefit of the inventor's thought and ingenuity.

The patentee can protect his rights only by bringing and prosecuting a suit in the Federal Courts and securing an injunction against infringers.

It seems strange that a person who would not think of trespassing upon the real property of another person, or who would not think of interfering with ordinary chattel property belonging to a stranger, will not hesitate to trespass upon the patented property of another, whenever it appears to him that such trespassing would inure to his advantage, considered from a business and financial standpoint.

Notwithstanding the fact that patented property is constantly being subjected to the attacks of infringers, such property is very valuable, and, as has already been pointed out, constitutes the basis of investment of many millions of dollars in the United States, and has been asserted in a comparatively recent annual report of one of the Commissioners of Patents "that we mainly owe to our patent system such foothold as we have gained during the past fifty years in foreign lands for our manufactured products."

WAYS OF SPENDING TIME.

There are twenty-four hours in every day—too few, some men find, for the serious work that they have to do; but others are always looking for something to do to "kill time." How anyone can find time to "kill" in a short life of three-score years and ten is a problem that appeals to the intelligent as supremely ridiculous. There may be time for work, time for rest and time for play, but there should be no time to kill. Reading the cheap stories in the magazines is even more profitable than mere time-killing—and they are about the limit.

There are men, however, who consume all the time not actually employed in bread winning to solving puzzles and charades and so forth. They do not do this for mental recreation after hours of severe strain, but merely as a time-killer, until bedtime comes or time to go to work again. It is almost needless to predict that they will never rise above their present positions or leave enough of personal history to make an inscription on a tombstone. Study to them, reading of valuable character, are unknown suggestions. There is no tide in their lives and when they are gone they will not be missed. Their chief purpose is to kill time.

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The illustration above shows the suburban home of a partner in one of the largest and most widely known industrial establishments in the world. Haines, Jones & Cadbury Company's Plumbing Goods were selected by the owner only after the most thorough investigation and comparison.

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AN AIR-WASHING DEVICE.

In a large office building in Pittsburg, there was recently set up an air-washing apparatus which has proved very successful, so that all drawings, papers, etc., which formerly got very dirty and grimy, are now kept clean, since no air can enter the building except through the heating apparatus, where it is thoroughly cleaned.

The heating apparatus acts with the washer, which consists of a metal supporting frame filled with broken coke, over which water trickles. The air passes between the coke fragments and is separated from its smoke and dust by the water which washes it to the bottom of the device, from which it may be removed.

A BIG CEMENT PIPE.

A cement pipe 6 inches thick, with an inside diameter of 42 inches and 13,400 feet in length, was recently finished at Galveston, Tex., to connect with the water supply of that city and a pumping station.

It is reinforced by steel bars which are inserted both lengthwise and around the pipe and give the structure its strength, stability and capacity for resisting pressure.

In constructing the pipe powdered lime was mixed with sand and soft soap and dissolved in water, and the three —lime, sand and soap—it is stated, have formed an insoluble combination. This mixture was formed to fill up any possible voids on the surface of the pipe.

In order to dispose of the air in the chamber about ten iron openings were erected on the line of this water pipe. The actual test of the pipe showed some few small leaks, but they have been repaired without much difficulty.

This is very much on the same construction as the Bordenave pipes, which have been used in France for a number of years and in waterworks in many parts of Europe, one of the most notable of which is found in the water system of Venice.—Cement Age.

FACTORY VENTILATION.

Two men employed in an Edinburgh rope factory have invented an apparatus for carrying off dust and bad air created by the machinery used in the flax industry. The principal sources of dust in a flax-preparing machine are the feed and delivery rollers. Over each of these parts is suspended a duct or flattened tube. An air-propelling fan, driven by belt and pulley, rotates in this horizontal tube. The tube may be made of such size and the fan of such power as to serve for ventilating a number of machines. To the lower part of the horizontal tube, ducts of flattened trumpet-mouth or rectangular shape are hinged at such an angle as to have their elongated narrow mouths over the rollers of one machine, or, it may be, two machines. Sliding doors, rotating grids, or equivalent devices, are fitted in these ducts to regulate the draft of air. Cords or chains are secured to the lower ends of the ducts and carried on pulleys, so that the ducts can be drawn up to give room when the machine is being cleaned or repaired. The dust and bad air drawn away from the machine by the suction caused by the centrifugal fan are discharged in the atmosphere or in any receptacle where water may be employed. The estimated cost of making these machines is $50 each.

SHEER HARD WORK MAKES INVENTORS.

While preconceived ideas rate the faculty for invention as a gift, expert opinion ranks it as a business. Evidence points to the fact that a gift in this direction alone makes a particularly unsuccessful and hopeless career, while without any special genius the qualities that are necessary to any other business can produce successful and remunerative inventions.

The encouragement offered to inventors in America makes it a field for business endeavor worth the attention of the worker. Professor Bell, who has had experience in both hemispheres, declares that the air of America is encouraging to inventors. "Application," he says, "is an element of success. Americans are not only quick to appreciate new inventions, but they are ready to back them with money."

Thomas A. Edison includes this principle in his advice to young inventors: "The first essential is to find out if there is, or will be, a real need for the thing that you want to invent. The next thing is to be sure that it is practical. With the object of making quick money from his inventions the beginner would best devise some little thing which it costs but little to manufacture."

After this preliminary advice, the next given by Mr. Edison is to pursue the subject with ceaseless and untiring thought. To think without cessation as long as possible and, after brief intervals for rest, to get up and go at it again are the rules laid down for the first step in the process. After following it persistently, he declares, something is sure to develop itself.

In telling how he goes about inventing a contrivance, Mr. Edison says: "First, I find out if there is a real need for a thing. Then I attack it in every way that I can. This multiplied attack soon simmers down till I get what I call a composite idea, something which is a combination of all I have thought before, or else the one feasible idea which seems to discount all the rest. Having once got started on what I think is the right track, I keep the pace up until I think the goal is reached.

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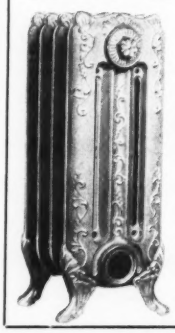

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"There is one piece of advice I can give. When a man starts to invent let him do so with his mind free from all knowledge of what has been done in that particular field in which he is investigating. To read up what has been done by other inventors is almost certain to prove a snag in the path of the inventor. The best way is to keep the mind free from all knowledge of what has been done already in the same field. When you work in this manner you will often find that, while your own ideas are original, another's may be just as good up to a certain point. If you had read what he had written you would have been tempted to follow in his footsteps.

"I believe that any person, even of the most limited capacity, can become an inventor by sheer hard work. You can do almost anything if you keep at it long enough. Of course, the man with the natural aptitude would get there first, but the other plodder eventually would gain his point. The constant brooding upon one thing is sure to develop new ideas about it. These, in turn, suggest others, and soon the complete idea stands out before you.

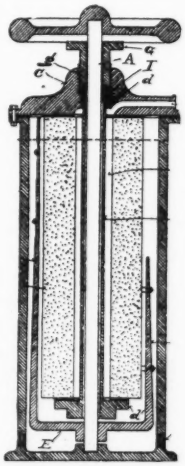
"Above all things, a man must not give up after he has outlined his plan of action. Of course, the question of natural aptitude enters into the matter, and without it no man can become a star; nevertheless, it is an auxiliary attainment. Dogged perseverance is really the quality to be desired. In the arts, such as music, poetry, painting and so forth, a special temperament is required, but in the workshop of science men of the sanguine kind come out ahead."

PATENTS

795,027. Lock-Faucet. Charles C. Connell, Haydenville, Mass., assignor to the Haydenville Company, Haydenville, Mass., a corporation of New Jersey.

John D. Mouat Co., of Detroit, Mich., is remodeling the plumbing in a residence in that city, using Cooper's Nautilus closet,—Adv.

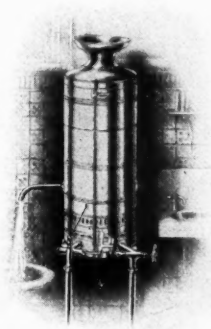
795,047. Water-Filter. Mirabeau N. Lynn, Cincinnati, Ohio, assignor to the Lynn Filter Manufacturing Company, Cincinnati, Ohio, a corporation of Ohio.



P. J. Glennon, of Seattle, Wash., is placing Cooper's fixtures in some buildings in that city—Adv.

795,057. Hydrant. Denis F. O'Brien, Newark, N. J.

Pickett & Goodwin, Beverly, Mass., are placing Cooper's closets in a residence in that city.—Adv.



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Herman A. Goth, of Indianapolis, Ind., is using Cooper's goods in some work he has on hand.—Adv.

795,066. **Filter and Cleaner.** Lewis E. Rogers, Washington, D. C.

Gray & Dormer, of Philadelphia, are plumbing two houses for Henry L. Brown, on Locust street, using Cooper's goods.—Adv.

795,053. **Relief Valve for Heating Systems.** Arthur McGonagle, East Orange, N. J.

Frank G. Kramer, of Ambler, Pa., is plumbing the residence of Leon H. Gilbert, at Noble, Pa., using Cooper's fixtures throughout.—Adv.

795,138. **Water-Distributing System.** Kenneth K. Kissell, Brownsville, Pa.

W. R. Meaker, of Albany, N. Y., is installing Cooper's Nautilus closet in a residence in that city.—Adv.

794,846. **Water-Heater.** Herman J. Blanke, Chicago, Ill.

Ware & Moodie, of Dayton, Ohio, are using Cooper's goods in some work they have on hand.—Adv.

794,931. **Water-Heater.** Martin Flatland, San Francisco, Cal.

J. H. Cogan & Co., of Augusta, Maine, are remodeling the plumbing in a residence in that city, using Cooper's Nautilus closet.—Adv.

795,334. **Ball-Cock for Water-Tanks.** John E. Burdell, Boston, Mass.

David J. Muncer, of Lansdowne, Pa., is plumbing the residence of Mr. Holtby, using Cooper's goods.—Adv.

795,411. **Vaporizer for Furnaces.** David L. O'Connor, Waynesboro, Va.

F. J. McGarry & Bro., of Philadelphia, are plumbing a West Philadelphia residence, using Cooper's goods.

795,448. **Relief-Valve for Heating Systems.** Arthur McGonagle, East Orange, N. J.

J. Ernest Schenck, of Philadelphia, is plumbing a residence in Asbury Park, N. J., using Cooper's goods.

795,455. **Lubricator.** Edward L. Seibert, Sr., Louisville, Ky.

R. L. Myers, of Round Hill, Va., is using Cooper's Nautilus closets in some work he has on hand.

795,464. **Heating Apparatus.** William S. Washburn, Brockton, Mass.

W. W. Murphy, of Peoria, Ill., is installing Cooper's Nautilus closet in a residence in that city.—Adv.

795,564. **Connection for Waste-Pipes.** Henry H. Turner, Rochester, N. Y.

H. S. Graham, of Delhi, N. Y., is using Cooper's Nautilus closets in some work he has under way.—Adv.

795,627. **Thermostatic Valve.** Henry W. Larsson, Springfield, Mass.

H. Kelly & Co., of Minneapolis, Minn., are installing Cooper's Nautilus closets in a residence in that city.—Adv.

795,666. **Steam-Trap.** Frederick A. Waldron, Stamford, Conn.

The Stephen Lane Co., of Atlantic City, are placing a controlling table with shower, needle and other bathing appliances of Cooper's make in Galen Hall.—Adv.

795,486. **Pipe-Wrench.** Frank G. Cornell, Louisville, Ky., assignor of one-fourth to August F. Willson, Louisville, Ky.

T. J. Cady, of Columbus, Mississippi, is using Cooper's goods in some work he has on hand.—Adv.

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WANTED—A SALESMAN WHO VISITS STEAM SUPPLY JOBbers in territory from Pittsburg to Denver, who is at liberty to take a side line on a commission basis. Address No. 338, care of DOMESTIC ENGINEERING, 64 N. Jefferson St., Chicago. 8-12

FOR SALE: IRON MANUFACTURING PLANT WITH CUPOla, blower, boiler, engine and shafting. Indiana town, 100 miles from Chicago. Will sell at a bargain. Address No. 288, care DOMESTIC ENGINEERING, 58-64 N. Jefferson Street, Chicago, Ill. tf

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WANTED—A MAN AS SUPERINTENDENT OF STORE BY A wrought iron pipe and fitting house in New York City. None but those having experience need apply and must state experience and reference in application. Address B. 47, care of DOMESTIC ENGINEERING, 89 Centre St., New York City. 8-12

WANTED—PLUMBER, WESTERN PENNSYLVANIA, IN town of 5,000 inhabitants; open shop; one who has some knowledge of hot water heating preferred; steady work; would sell half interest in business to right party. Address No. 342, care of DOMESTIC ENGINEERING, 64 N. Jefferson St., Chicago. 8-19

FOR SALE—Having reached the age at which I feel that I can retire from business, and being financially able to do so, I offer for sale my old established business in a growing western city of 130,000 population. This year there is more business than ever, and my business is in a perfectly satisfactory condition. I have always done the leading plumbing and heating business in the city and can turn it over to my successor with its good will unimpaired. I own the building, erected for my purposes, and will lease it to my successor. Will make easy terms to a man of integrity. Address No. 334, care of Domestic Engineering, 58-64 N. Jefferson St., Chicago.

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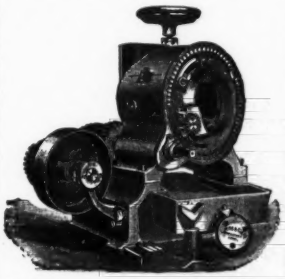

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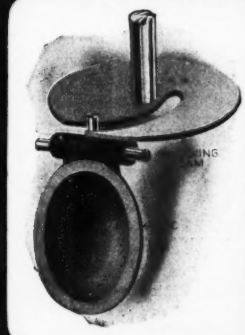

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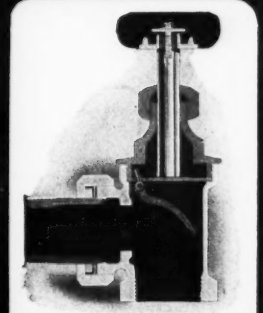

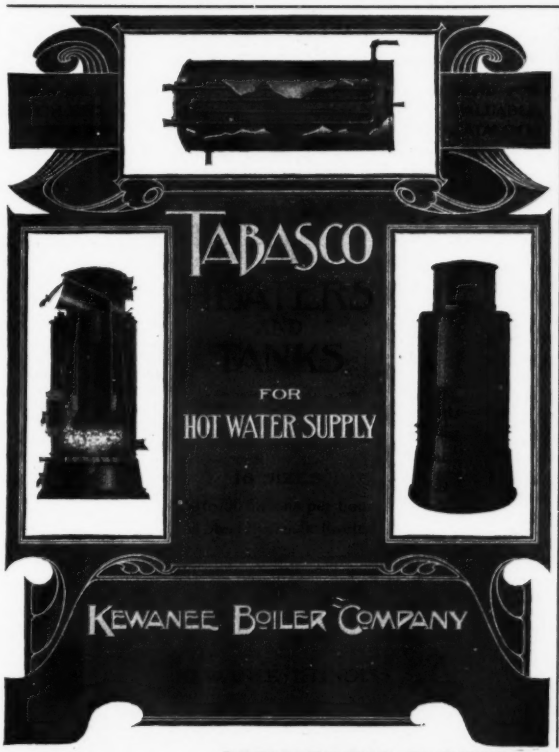

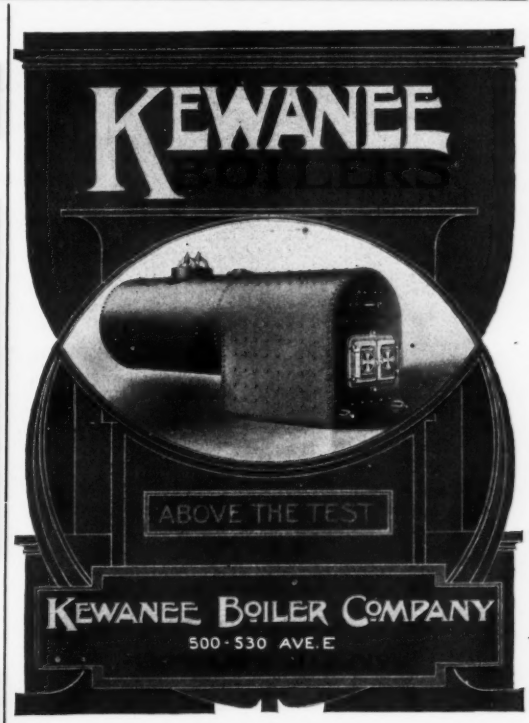

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Simmons Co., John..... 35
Simpson, Bevans & Co...W. St. Ed., 64b
Smith & Anthony Co....Boston Ed., 64
Smith Co., H. B..... 14
Smith & Egge Mfg. Co..... 74
Smooth-On Mfg. Co..... 18
Snyder & Co., L. H..... 16
Speakman Supply & Pipe Co..... 61
Stambach & Love..... 68
Standard Pump & Engine Co..... 16
Standard Sanitary Mfg. Co..... 55
Stewart Filter Co.....W. Sta. Ed., 64
Swadkins, W. F.....W. Sta. Ed., 14a

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Trenton Brass & Machine Co..... .....N. Y. Ed., 64
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Union Brass Works Co..... 70
United Brass Mfg. Co..... 1
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U. S. Radiator Co..... 22
Utica Heater Co..... 11

Victor Water Heater Co..... 18

Walls & Pearsall.....Phila. Ed., 64
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Weiskittel & Son, A..... 72
Werntz & Co., O. W..... 50
Western Tube Co..... 20
Wilks Mfg. Co., S..... 4
Williams & Co., J. H..... 8
Williams Valve Co., The D. T..... 9
Winsted Cabinet Co..... 62
Wolff Mfg. Co., L..... 65
Wright Mfg. Co.....Phila. Ed., 13

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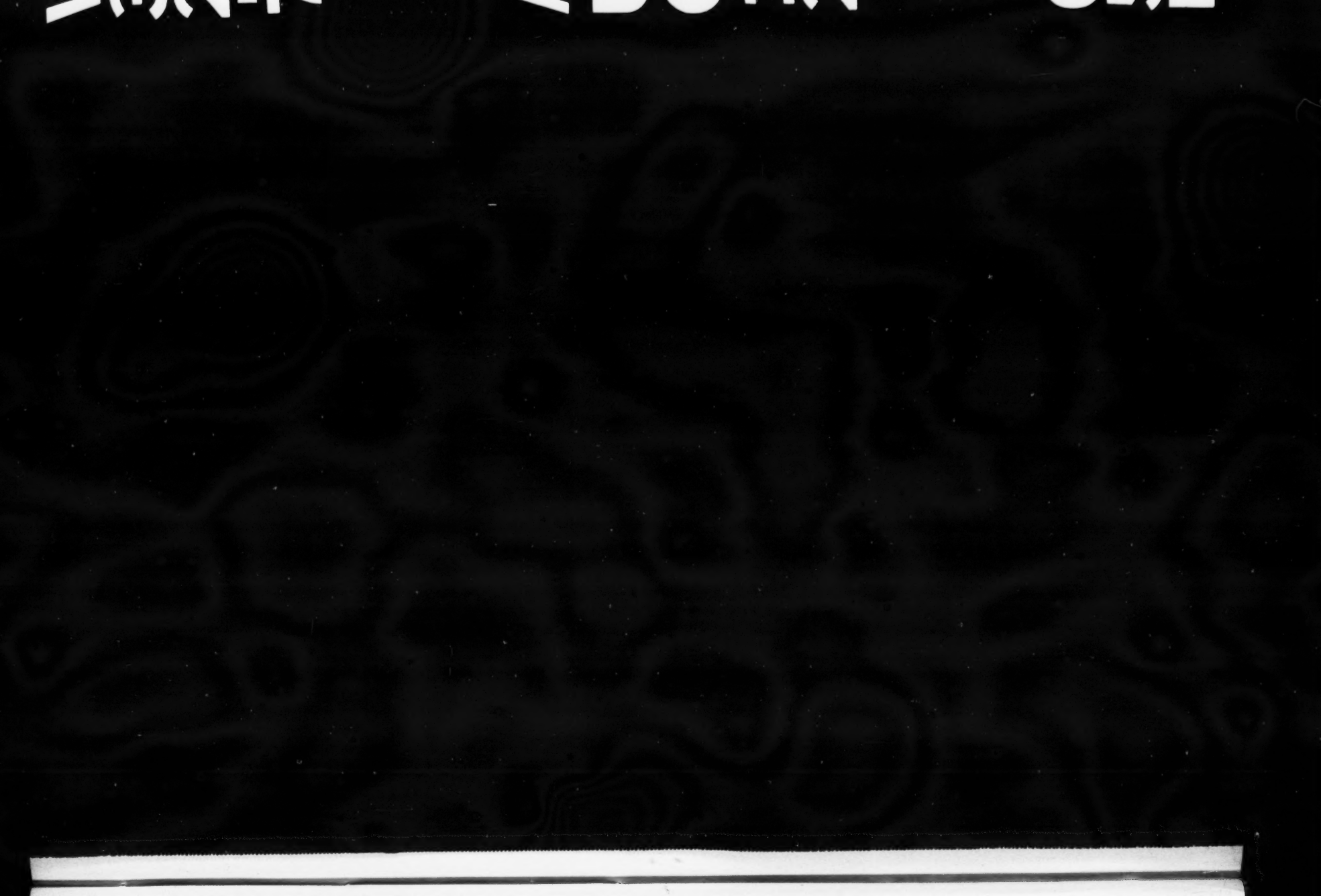


PAGE(S)

MISSING

Square Back Syphon Jet Closet with Earthenware Tank

OUR LATEST DESIGN

A fixture absolutely first class. The kind your customers will be satisfied with.
Put one in your show-room. We sell to legitimate jobbers only.

The Great Western Pottery Co., Kokomo, Ind.

MENTION DOMESTIC ENGINEERING

Barnes' Porcelain Enameled Ware is used by the Best Plumbers.

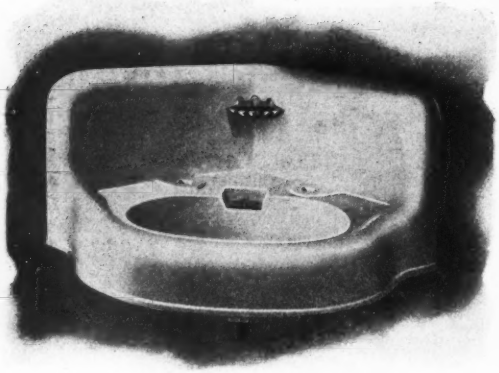


PLATE 1431 B.

The reasons for this may be found in our new Enameled Ware Catalogue, which is sent promptly on request. The cut shows Barnes' Porcelain Enameled Roll Rim Corner Lavatory, D shaped basin, with apron and back cast in one piece. We ship all orders promptly.

The Barnes Mfg. Co., Mansfield, O.

Notice to Plumbers

You are often required to figure on a water supply for household, barnyard, irrigation, mining and manufacturing purposes.

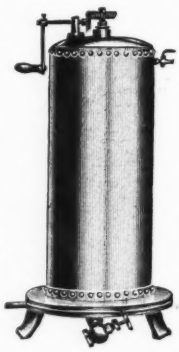
The Niagara Hydraulic Ram is the most highly developed automatic pump in the market to-day. It pumps without attention from three to five times as much water as the old fashioned ram and the first cost of installation is the final cost.

We want Plumbers in every section of the United States to become agents for the Niagara, the most efficient ram built. Thousands are in use scattered in almost every State.

Write for catalogue and agent's commission. This is an opportunity you should not overlook.

Niagara Hydraulic Engine Co.

Chester, Pa.
or 140 Nassau St., New York, N. Y.



SALABLE SIMPLE SOUND

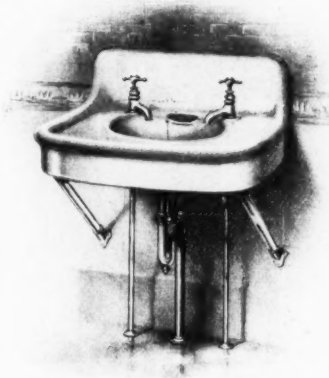
But one valve to open and one crank to turn and it's all done. Capacity from 500 to 1,000 gallons. *Write for plan.* PLUMBERS WANTED FOR AGENTS.

Stewart Filter Co.
216-218 Bourbon St., New Orleans, La.

$3.00 SAVED
TO ALL POINTS EAST AND WEST
VIA THE D&B LINE.
"Just Two Boats"
BETWEEN
DETROIT & BUFFALO
Daily Service
DETROIT & BUFFALO STEAMBOAT CO.
DETROIT
TOLEDO
CLEVELAND
BUFFALO
NIAGARA FALLS
THE DIRECT AND POPULAR ROUTE TO POINTS EAST
DAILY SERVICE, MAY 10th
Improved Express Service (14 hours) Between
DETROIT AND BUFFALO
Leave DETROIT Daily - 5.00 P. M.
Arrive BUFFALO " - 9.00 A. M.
Connecting with Morning Trains for all Points in NEW YORK, PENNSYLVANIA and NEW ENGLAND STATES.
Through Tickets sold to All Points, and Baggage Checked to Destination.
Leave BUFFALO Daily - 5.30 P. M.
Arrive DETROIT " - 7.30 A. M.
Connecting with Early Morning Trains for Points North and West.
Rate between Detroit and Buffalo $3.50 one way, $6.50 round trip. Berths $1.00, $1.50; Staterooms $2.50 each direction.
Send 2c Stamp for Illustrated Pamphlet.
RAIL TICKETS HONORED ON STEAMERS
All Classes of Tickets sold reading via Grand Trunk, Michigan Central and Wabash Railways between Detroit and Buffalo will be accepted for transportation on D. & B. Strs. in either direction between Detroit and Buffalo. A. A. SCHANTZ, G.S & P.T.M., Detroit, Mich

READ THE ADVERTISEMENTS

NEW Vitreous Lavatories



FORT PITT Supply Co. PITTSBURG PENN.

These magnificent additions to Sanitary art are the finest things ever made. They are vastly superior to enameled iron, both in beauty, elegance, color, durability and perfection. They cost but little more than iron lavatories and are so much better they should not be mentioned in the same sentence. Ask for prices.

FORT PITT Supply Co. PITTSBURG PENN.

NOT ONLY THE LATEST, BUT ALSO THE BEST

M. I. W.
BOILER STANDS

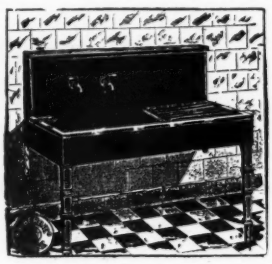
will support five times possible requirements. Weight of 12, 13 and 14 inch stands only 10 lbs. They occupy less space and ship to better advantage than any other boiler stand made. The side arms are adjustable so that stands will set level on any floor. We furnish special rings for odd size boilers without extra charge. All stands are carefully fitted and can be put together in half a minute. Our excellent facilities make it possible to meet all competition.

We make other plumbing specialties.
Write for catalogue and price list

MODERN IRON WORKS
QUINGY, ILLINOIS

Lest we forget, let us remind you that

Alberene Stone



makes good

Kitchen Sinks AS WELL AS Laundry Trays

Write for further information to

ALBERENE STONE COMPANY

54-60 NORTH CLINTON STREET
CHICAGO, - - ILLINOIS

SIMPSON, BEVANS & CO'S

Perfect Printing Plates Please Printers

SPECIAL ATTENTION GIVEN TO OUT-OF-TOWN CUSTOMERS
LET US SUBMIT SAMPLES AND PRICES ON THAT NEW CATALOG

TELEPHONE OR WRITE

SIMPSON, BEVANS & CO.

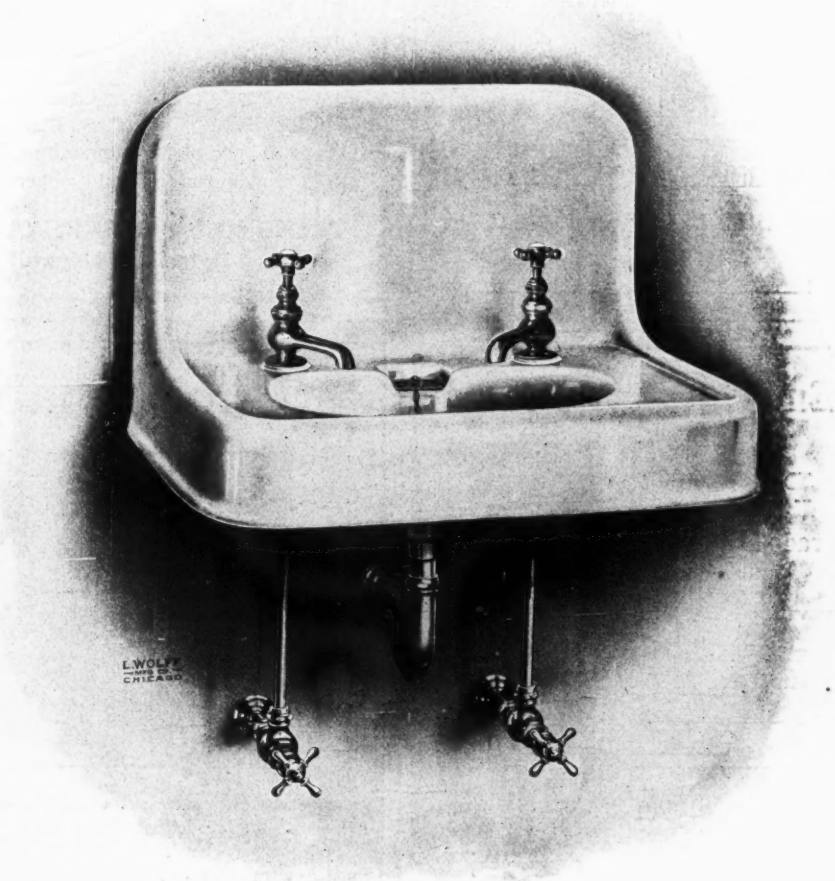
164-170 South Clinton Street
Chicago
Telephones: Main 4757, 4777

READ THE ADVERTISEMENTS

FIFTY YEARS OF QUALITY

WOLFF'S PLUMBING GOODS

ENAMELED IRON LAVATORIES



Slab, Aprons and Back cast in one piece.
Sizes 18x24 with 10 inch Back.
Sizes 20x24 with 12 inch Back.
With concealed Wall Hanger.

F-6031.

L. WOLFF MANUFACTURING COMPANY

ESTABLISHED 1855.

MANUFACTURERS OF PLUMBING GOODS EXCLUSIVELY

GENERAL OFFICE, 93 W. LAKE ST.; SHOW ROOMS, 91 DEARBORN ST., CHICAGO

MENTION DOMESTIC ENGINEERING

Clean and Flush Your Drains

Fig. 1 shows direct pressure water washing out and cleaning House Drain Back Water Gate Valve, the interior of fitting and the drain.

Fig. 2 shows Wade Accessible Straight-Way Clean-Out House Drain Back Water Gate Valve and Fitting installed, showing flushing pipe connected to fitting and having iron extension manhole, which extends from the drain in the ground to the surface of cellar floor, and provided with a water and gas tight metal cover, bolted down to a gasket and easily removed for inspection without disturbing floors or concrete. Pressure water should always be connected to flush pipe on fitting to clean the back water gate valve and interior of drain.

Wade Accessible Straight-Way Clean-Out House Drain Flushing Back Water Gate Valve.

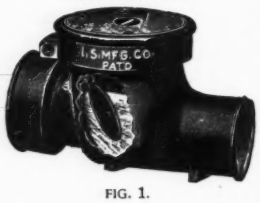


FIG. 1.

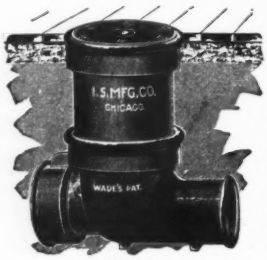


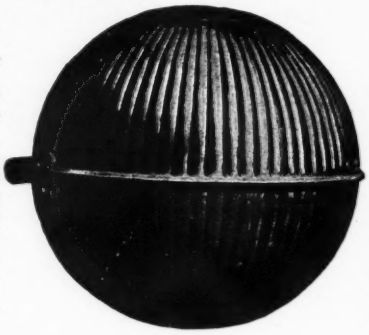
FIG. 2 INSTALLED

The Pipe Hub on Fitting is for either Vitrified Clay Pipe, Standard or Extra Heavy Iron Pipe.

Iron Sanitary Mfg. Co.

52 and 54 Dearborn Street,
CHICAGO.

SOME THINGS
we make:



FLOATS Copper or Zinc; Flush and Supply PIPES; Connected Wast and Overflows; Traps; Hinges; Ells; Offsets for Low down Tanks; Brass and Bronze Castings; Stampings in Sheet Steel, Copper or Brass. Probably better equipped than any one to make favorable prices to manufacturers and jobbers.

DIAMOND STAMPED WARE CO.
Detroit, Michigan.

The Empire Brass Mfg. Co.

Manufacturers of

PLUMBERS'

High Grade Brass Goods

REMOVED TO

181-183 LAKE AVENUE
CLEVELAND, OHIO

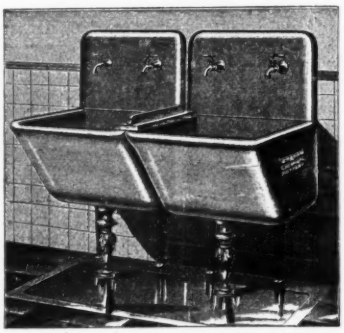
Write for Catalogue B, 1904.

BRASS TRAPS — All kinds and sizes.

DOHERTY and BOSTON BASIN COCKS and BIBBS — all styles.

SPECIAL BRASS WORK TO ORDER.

Imperishable



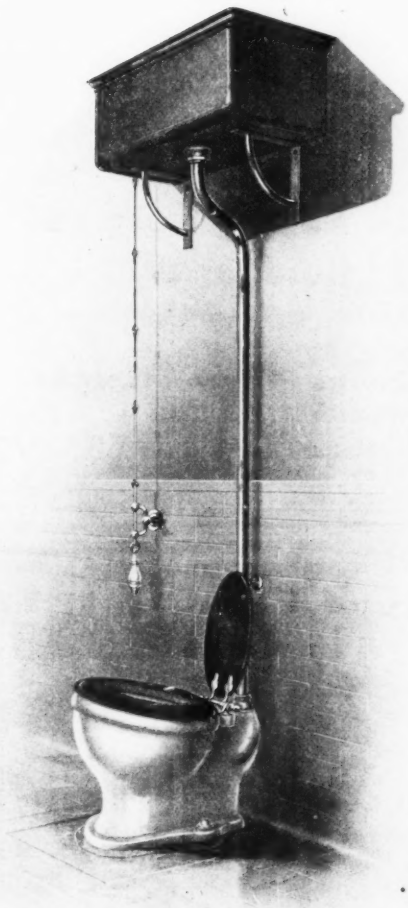
Our laundry trays and sinks are imperishable save from violence. They are of most beautiful appearance, solid porcelain, highly glazed. The particular plumber can install nothing more satisfactory to his customer or helpful to his own reputation for good work. Our catalogue will come to you promptly upon request.

Charles Graham Chemical Pottery Works

986-1018 Metropolitan Ave., Brooklyn, New York.

WE PAY-YOU POCKET

Could any Proposition Be more Attractive To You?



Our good money is being liberally spent in advertisements—

From all of which you will secure the benefit.

All you have to do is to put in a sample line of NATURO CLOSETS—recognized by all familiar with them as the best sellers and the most satisfying.

Other plumbers are taking advantage of our unusually good offer.

Won't you?

THE NATURO COMPANY

C. H. Muckenhirn, President.

Salem, N. J.

MENTION DOMESTIC ENGINEERING

BUFFALO METER CO.

Manufacturers of

Fuel Oil METERS and Meter Appliances

Niagara Water Meters

Write for CATALOG and PRICES

290-296 Terrace, BUFFALO, N. Y.

SISSON INSERTABLE JOINT

Indispensable to Plumbers.

A friend in need is a friend indeed.

The S. I. J. for Soil Pipe.

OLD METHOD "ANY OLD WAY"

Sizes 2 to 6 inches. Light and Heavy. Makes a neat job and saves your patience.

This does the trick.

ASK YOUR JOBBERS FOR IT.

BEST METHOD "OUR WAY"

MANUFACTURED BY

R. ESTABROOK'S SONS

SOUTH BOSTON, MASSACHUSETTS

Perth Amboy Ceramic Company

Perth Amboy, N. J.

Manufacturers of

Solid Porcelain Sinks, Washtrays, etc.

Price lists and trade discounts sent upon application.

S. P. STAMBACH ROBERT LOVE

Stambach & Love

Plumbing Supplies and Sanitary Specialties

50 and 52 N. Seventh St., PHILADELPHIA

CAST IRON FITTINGS WITH CAST THREADS

embody many points of merit.

GOOD, CLEAN, SHARP THREAD STANDARD GAUGE

Unvarying In Size

Perfect In Allignment

It is economy to use these fittings because they insure perfect joints.

Manufactured by

THE CAST-THREAD FITTING & FOUNDRY CO.

SENECA FALLS, N. Y.

NONE BETTER MADE

"Buffalo" Stop and Waste Cocks.

Made of best red metal; have simplest reversible feature of any right and left stop and waste made. Each cock given a test as near actual service as possible and unconditionally guaranteed.

FRIES & COMPANY

89-93 Main Street, Buffalo, N. Y.

READ THE ADVERTISEMENTS

WHY WE MAKE IT

BECAUSE BY SO DOING WE FILL A WANT AND AT THE SAME TIME MEET A STRONG DEMAND.

THE ALTON CLOSET BOWL

IS WITHOUT EQUAL FOR PUBLIC USE.

SOLID FLUSHING RIM.
MASSIVE BOWL.
HEAVY BASE.

Write for Circulars.

PATENTED

FIG. A. 216. THE ALTON.

WHY YOU WANT IT

BECAUSE IT IS THE MOST NEARLY PERFECT PRODUCT OF THE SANITARY POTTERS' ART AND OF THE SANITARY ENGINEERS' SCIENCE.

THE WATROUS AQUAMETER

IS A PERFECT ACTING FLUSHING VALVE DISPLACING BY RIGHT OF SUPERIORITY THE HIGH TANK CLOSET.

WE PROTECT ALL USERS OF OUR GOODS AGAINST INFRINGEMENT SUITS.

Nos. 227-237 Washington St. **FEDERAL COMPANY** CHICAGO, ILLINOIS

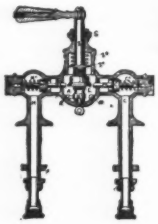
Nelson Septic Sewage Disposal System.

The progressive members of the plumbing trade all over the country have long since found out that it was necessary to keep in touch with all of the improvements, which are made from time to time, in sanitary appliances, in order to secure a good profit to themselves by being in advance of their competitors in their knowledge of business.—One of the great successes of the past two years has been the **Septic Tank Sewage Disposal System** put upon the market by the

N. O. NELSON MFG. CO. of St. Louis

Following its established record for 33 years of leading in the introduction of Sanitary Improvements the N. O. Nelson Mfg. Co. has put on the market a System for disposing of Sewage Solids by Bacterial action. The only discharge from the Tank or Reservoir is practically clear and odorless water. The company has installed more than 50 plants for towns, hospitals, schools, factories, U. S. Government barracks and private residences. Plumbers can add materially to their business by promoting the use of this System. Catalogue on application.

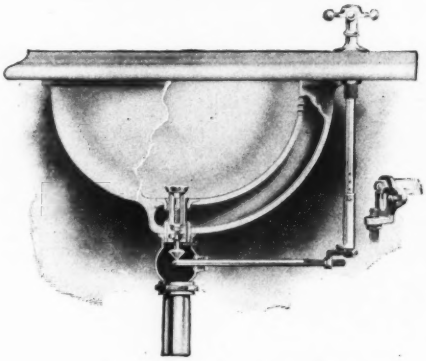
MENTION DOMESTIC ENGINEERING



UNION BRASS WORKS COMPANY

SOLE MANUFACTURERS OF

SODERLUND



HIGH GRADE PLUMBING

SPECIALTIES

7 SHERMAN STREET

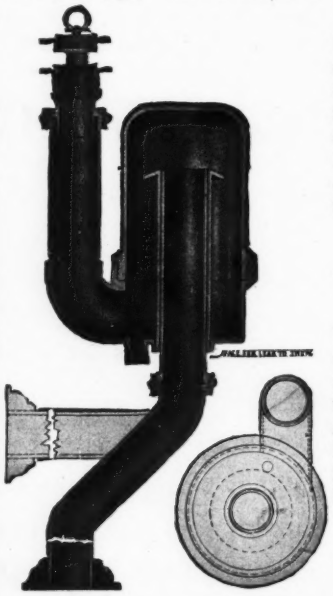
(Charlestown Dist.) BOSTON, MASS.

Stop and Waste Cocks, Soldering Nipples, Steam Cocks, Gas Cocks, Air Cocks Air Valves, Radiator Valves, Compression Work, Etc. Send for catalog.

We are also now in position to make any kind of Brass Castings and at right prices. Ask us.

EAGLE BRASS WORKS, DETROIT, MICH.

THE ONLY ONE



There is no other trap with centripetal and centrifugal action produced by waste inlet entering body of trap at a tangent.

THE "POSITIVE"

Trap will carry off anything which will pass through the strainer. Like all our goods it is the best of its kind.

CATALOGUE FREE

The Ohio Brass & Iron Mfg. Co.

CLEVELAND, OHIO.

READ THE ADVERTISEMENTS

Money Saved—IS—Money Made

HERE'S YOUR CHANCE TO MAKE IT

No. 9
Low Down
Combination

Fully
Guaranteed

List Price
$15.00

SPECIFICATION:

Vitreous syphon action bowl. Golden oak woodwork. Post hinge seat and lid. Tank fitted with Douglass ball and compound lever ball cock.

IT WILL AID YOU IN GETTING BUSINESS

FLECK BROS. COMPANY, PHILADELPHIA, PA.

TRY OUR RUSH ORDER DEPARTMENT

MENTION DOMESTIC ENGINEERING

The "Niagara" Hydrant

EASY OF REPAIR

All working parts including spout and waste made of brass. Valve so constructed that proper amount of water wastes at the proper time.

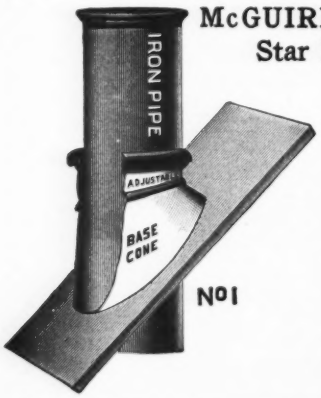
LOW IN PRICE AND PROMPT DELIVERIES

Also Niagara Self-Closing Hydrants and Street Washers.

Macungie Brass & Mfg. Co.

MACUNGIE, PA., U. S. A.

Patent Pending.



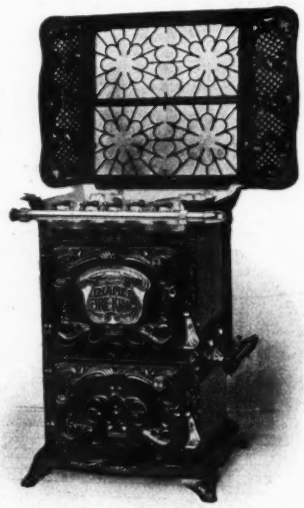
McGUIRE'S Adjustable Star Roof Flange

is the best device of its kind that has ever been offered to the trade. Made in copper and galvanized iron for standard and extra heavy pipe. No. 1 has angle of ¼ pitch to 45 degrees. Approved by New York State Master Plumbers at Albany, Feb. 9 and 10, 1904. Send for circular and price list to

H. E. Hessler Co.

SOLE MANUFACTURERS,

Syracuse, N.Y., U.S.A.



Improved White Enameled Top Fire King Gas Range

Top hinges back, burners lift out and top can be kept perfectly clean. Easy to sell, easy to operate. Always give perfect satisfaction. Write for complete catalogue and prices. Manufactured by

A. Weiskittel & Son, Baltimore, Md.

Open every business day 8 a.m. to 5 p.m. FREE

If you have anything you wish to show to the Building Trades, Architects, or the Public, place it in

THE BUILDERS' EXCHANGE

PERMANENT EXHIBITION

For Particulars write the Superintendent

18 to 24 South 7th Street, Philadelphia, Pa.

FUEL ECONOMY GUARANTEED

VACUUM STEAM HEATING SYSTEM

Morgan & Co. Chicago.

Another New Addition to our "High Grade" Line

"PARAGON"

PATENT

GROUND KEY WORK

Full Waterway

Absolutely Dustproof

Grinding the Best

Fully Guaranteed

Patented February 7th, 1899. Other Patents Pending.

Weight Exceeded By None

The Very Best of Metal

New Features Adding Greatly To Strength

Tested to 200 Lbs.

As will be observed, the manner of fitting the cap on the body instead of the plug is a new feature. This insures greater bearing surface, consequently much more strength. Our cap is absolutely dust-proof. No open holes or slots being necessary.

OUR GUARANTEE

The trade knows our reputation as manufacturers of "High Grade" goods. We can't afford to put a new article on the market that is inferior. We know our PATENT "PARAGON" GROUND KEY WORK has advantages over other makes, and possesses none of their defects, and it is with the greatest confidence that we introduce this new line to the trade, guaranteeing every piece of goods to be strictly first-class in every respect.

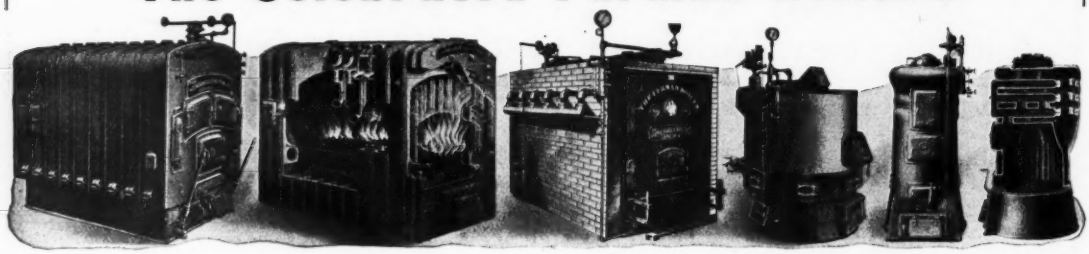
THE SANITARY COMPANY

Manufacturers of "Paragon" Plumbers' Brass Goods

1-9 WATER ST. CLEVELAND, OHIO

MENTION DOMESTIC ENGINEERING

The Celebrated Furman Boilers



Valuable Catalogue and Booklet "Warmth" on Modern Steam and Hot Water Heating, mailed free. Address

The Herendeen Manufacturing Company
Dept. D. Geneva, N. Y.
39 Cortlandt Street, NEW YORK 39 Oliver Street, BOSTON

As an Investment, Furman Boilers return large Dividends in improved Health, increased Comfort and Fuel Saved.

SELLING AGENTS:
EDW. S. DEAN, Bloomington, Ill. E. K. BARR, La Crosse, Wis.
JAS. SPEAR S. & H. CO., 1014 Market Street, PHILADELPHIA.

PLUMBERS' CHAIN, EIGHT HOOKS, SPLIT LINKS, CLOSET PULLS, PIPE STRAPS, JACK CHAIN, ETC.

Write for Catalogue of

Plumbers' Specialties

TO

THE SMITH & EGGE MFG. CO. BRIDGEPORT, CONN.

McGuire's Adjustable Star Roof Flange

makes a perfect water-tight joint around soil pipe. Is easily adjusted to suit the different pitches of roofs. Angle of No. 2 from flat to ⅓ pitch. Use one and you will never use any other. Approved by New Jersey Master Plumbers at Orange, April 19 and 20, 1904. Write for catalogue and prices.

H. E. Hessler Co.
Sole Manufacturer
SYRACUSE, N. Y.

Boss-Mitchell Company

724 GATES AVENUE,
Station S. BROOKLYN. N.Y.

Manufacturers of
LEATHER, RUBBER FIBRE, PASTE-BOARD AND FELT

WASHERS

FOR WATER, OIL AND MECHANICAL USES.

SEND US SAMPLES OF SIZES YOU USE, AND WE WILL QUOTE YOU PRICES.

THE B. B. HIGH PRESSURE BALL COCK

The Simplest and Best Cock Ever Made.

All sizes ½ inch to 3 inches inclusive for Top, Bottom or End Supply and also for Low Down Tanks with special float. No special packing required. Ground joint coupling which is always tight. Roller bearing lever on cam, reducing friction to lowest amount. No hammering, no singing or whistling. Has only one packing which is easily removed. Removable seat of best steam metal. We are making Floats stamped with our B. B. which are thoroughly guaranteed.

Ask Your Jobber for Them.

Boston Brass Company, - - - - 36 & 40 Oliver Street, Boston, Mass.

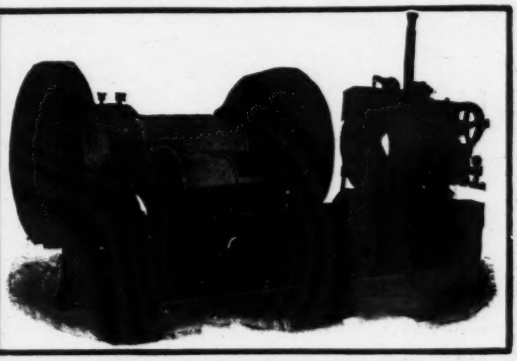
READ THE ADVERTISEMENTS

If you want a 12 inch Machine

to use any time in the near future you had better order it now. We have had a regular land slide of orders since the first of the year and are "chock full of business".

There must be some reason for our getting all these orders. If you have used our machines you know what it is—if you haven't we will be glad to tell you the reason. Don t put it off!

Bignall & Keeler Mfg. Co., Edwardsville, Ill.



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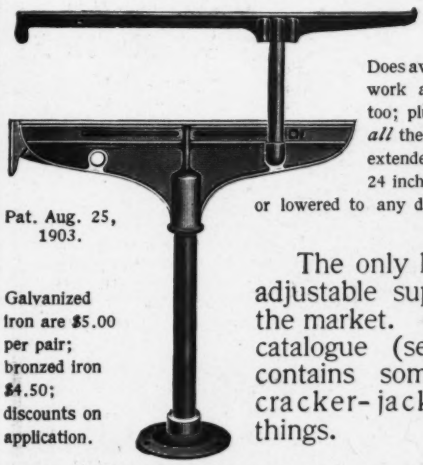

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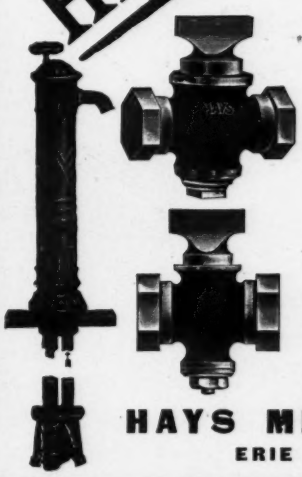

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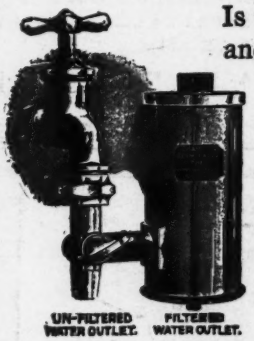

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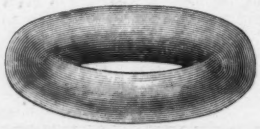

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